November, 1961

Plant Engineering

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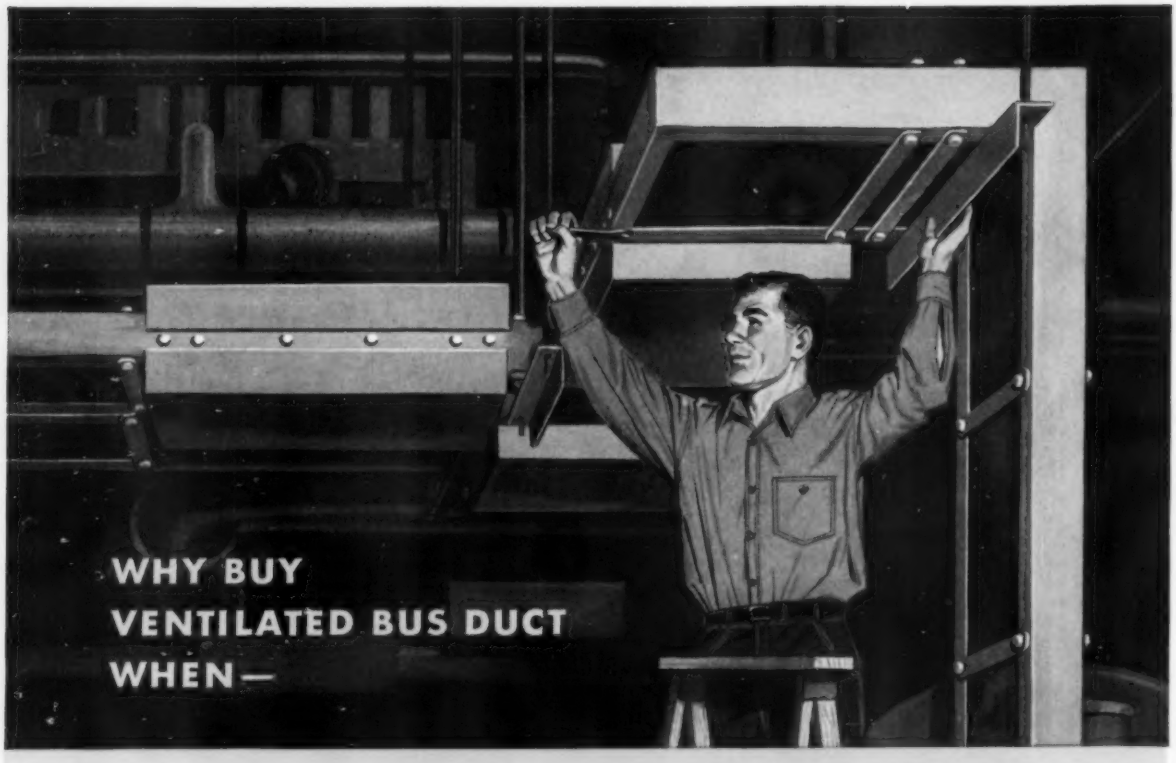
The magazine that helps plant engineers with their everyday problems

Volume 15, No. 11 Circulation of this issue 52,245



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mounts in any position without de-rating

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Square D totally enclosed low-impedance bus duct mounts in any position without de-rating, because it doesn't need ventilation. Moreover, you can have all the advantages of totally enclosed duct without the price penalty of a "special," because all Square D low-impedance bus duct is totally enclosed. Square D feed-in duct has no ventilation holes, is protected from physical damage and dust accumulation. It's smaller than ventilated duct by as much as 50%. Doesn't it make sense, when buying low-impedance duct, to specify a product that meets every one of your requirements? Square D totally enclosed low-impedance duct costs no more —why settle for less?

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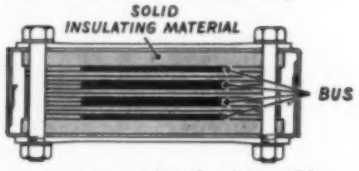

The entire space within the duct and between the bus bars is filled with a solid insulating material which conducts the heat to the surface. There are no dead air spaces inside the duct. Square D totally enclosed low-impedance duct meets U/L requirements for temperature rise with no larger bus bars (hence, no higher cost) than ventilated duct.

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Circle 501 on postcard, page 33

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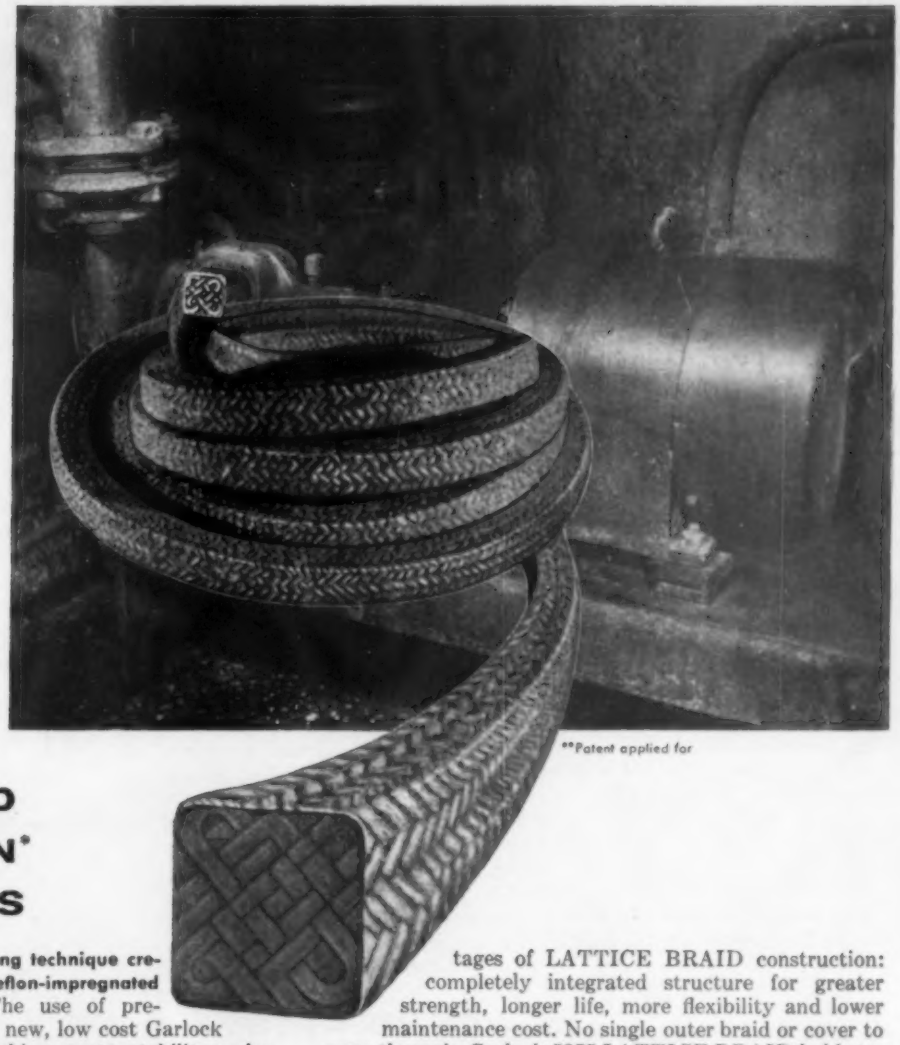

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GARLOCK

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Plant Engineering November 1961, Volume 15, No. 11

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'ROUND ABOUT with the editors

Edited by R. L. Marinello

Plant Engineers Turn Detective

PLANT ENGINEERS should don their Sherlock Holmes' gear and, with magnifying glass in hand, search in every corner of their plant to see if they have the oldest hydraulic or air powered cylinder made by Hanna Engineering Company.

If you are among the winners, you will receive a cash reward. In addition, Hanna would like to exchange some of the oldest cylinders for new power cylinders of the latest design. The old units will be brought back to the company plant for the engineers to study, then they will be put in the company's power cylinder display.

From these studies, the company hopes to learn of any unusual uses of the power cylinders, plus some additional tips on good maintenance procedures from the plant engineers.

To get your entry blank, write to Hanna Engineering Works Search Contest, 1765 Elston Ave., Chicago 22, Illinois. All entries for this Reward-Search must be sent in by November 30, 1961, in order to qualify.

Plant Engineer Promoted

Burton W. Van Dyke, formerly plant engineer, has been named to the new post of manager of manufacturing at Standard Pressed Steel Company, Jenkintown, Pa.

He is a mechanical engineering graduate of Drexel Institute, Philadelphia. He joined the company as plant engineer in 1949. His primary responsibility has been the supervision of construction of new plant facilities and expansion of existing facilities in this country and abroad. In 1959, he was placed in charge of tool room and tool engineering operations for the company and earlier this year was named manufacturing manager of fastener products.

Electric Welding Library

LOOKING FOR some information on electric welding? If so, you may find the answer in the library collection of technical papers being offered by Linde Company.

The library contains papers on process and application details on short arc welding, mig and tig welding and spot welding, submerged arc welding, plasma arc cutting, welding and weld surfacing.

For further information on the papers available, write to Linde Company, Division of Union Carbide Corp., 270 Park Avenue, New York 17, N. Y.

Paint Sealer for Masonry

PAINT ON masonry surfaces has been shown to withstand the elements better when applied over coats of a new isocyanate primer-sealer base recently tested by chemists at the U. S. Naval Research Laboratory.

Due to the wide variety and conditions of masonry surfaces, water-base paints used with customary surface sealants have not met with unqualified success. The new primer-sealer, however, the report says, contains a commercially available material of the isocyanate type that shows promise as a base for acrylic emulsion paints.

Tests of the new primer are described in a report available to industry. The report, An Isocyanate Primer-Sealer for Masonry (PB 171 107), is available from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Price is 50 cents.

Plant Engineer Moves Up

Hayward F. York has been appointed manager of manufacturing engineering for Chrysler Corporation, Detroit, Michigan. In this position, he will be responsible for corporate staff activities related to production engineering, plant engineering, nonproductive standards and facility analysis activities.

He joined the company in 1933 at the Plymouth Division where he held various supervisory positions in the production and machining departments. In 1941 he was transferred to Chrysler's Detroit Tank Plant as a production foreman, and two years later he returned to Plymouth as zone engineer for all machining operations.

He was appointed assistant plant engineer at Plymouth in 1949 and became plant engineer at the Detroit Tank Plant when production resumed

Subscriptions: U.S.A. $10. Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by the 15th of month to make the change effective with following month's issue. Controlled circulation publication, postage paid at Milwaukee, Wis. Published monthly.

BPA NBP

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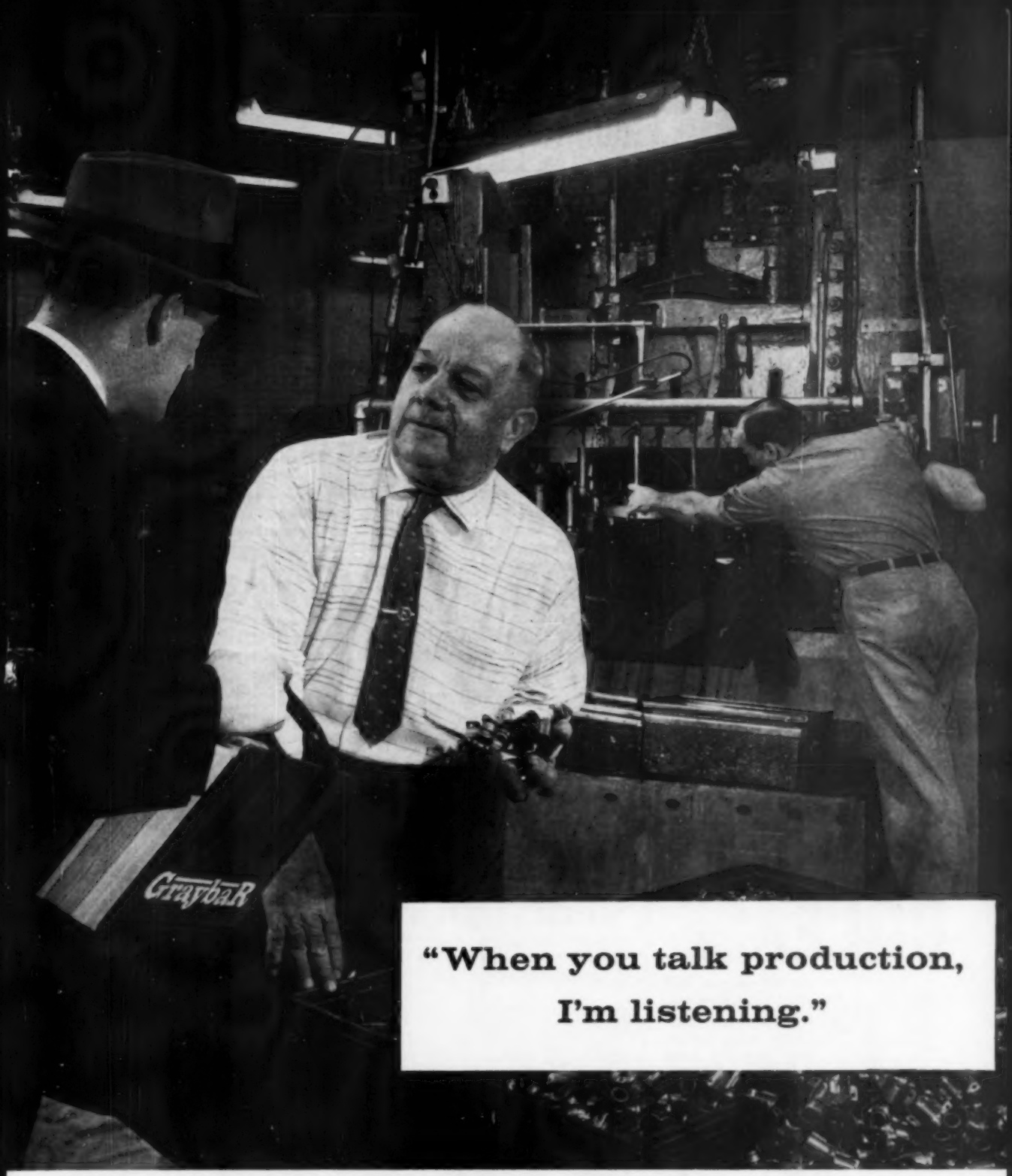

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Circle 503 on postcard, page 33

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Circle 504 on postcard, page 33

'ROUND ABOUT

there in 1952. Promotions followed in 1954 and 1955 and in 1957 he moved to the company's Corporate Manufacturing Staff, which position he held until his present appointment.

Clean Room Association Organized

LAST FALL the Phoenix Chapter of the AIPE sponsored a symposium on Clean Rooms at the University of Arizona. This conference was very successful, and subsequently led to the formation of the American Association for Contamination Control. Officers of the Association are: president, James Mildon, Lear, Inc., 110 North Ionia Ave., Grand Rapids 2, Mich.; vice presidents, Edward F. Casey of the Rocketdyne Div. of North American Aviation Corp., Irving M. Kodel of the Sandia Corp. and Alvin Lieberman of Armour Institute; treasurer, Chris Gort, Sperry-Phoenix Co.; and secretary, Eugene A. Sloane, *Air Engineering*.

At the first meeting of the officers in June, 11 directors were elected: Arthur Baker, Baker Instruments, Inc.; Carl Schmidt, Kearfott; George Hamilton, General Electric X-Ray, Inc.; Robert Avery, Cambridge Air Filter, Inc.; Richard Cadle, Stanford Research; R. Mason Pilcher, Battelle Memorial Institute; Marvin Salzenstein, Walter C. McCrone Associates; Marvin Pratt, New Department Division, General Motors; Norman Cash, Texas Instruments; John Barhite, Eastman-Kodak; and Clyde Orr, Georgia Institute of Technology.

In view of the many technical orders on contamination control from the Army, Air Force, Navy and NASA, a meeting was held September 15 as a means of setting up a coordinating agency for White Room activities and contamination control between the various services and civilian manufacturing organizations. For a full report on this meeting turn to page 134 in this issue.

A three-day session of the first national Contamination Control Symposium and Convention is planned for March, 1962 in San Francisco. Regional workshop meetings are being planned for the coming year.

Plant Engineering Participates in Industrial Building Congress

MANY PLANT ENGINEERS came away from the recent Industrial Building Congress held in New York with a lot of helpful ideas on building construction. In all, there were a total of 19 sessions on all phases of construction—from planning a new building to modernizing an old structure.

The session in which PLANT ENGINEERING participated was: Making More Effective Use of Building Models. The speaker of this session was Robert E. Buenting, Superintendent of Manufacturing Planning, Air Conditioning Division, Westinghouse Electric Corporation, Staunton, Virginia. The chairman was Richard H. Morris, Editorial Director, PLANT ENGINEERING.

All of the papers presented at this three-day conference will be published in a book which will be sent to each attendee. Others interested in purchasing this book should write to Clapp and Poliak, 341 Madison Avenue, N.Y.

Speaker Robert Buenting answers questions during the question and answer period of the session on Building Models. Seated at right is Richard H. Morris, Editorial Director, Plant Engineering, who served as chairman.

Circle 503 on postcard, page 33

CLIMAX MOLYBDENUM

Molysulfide® News Digest

CLIMAX MOLYBDENUM COMPANY, a division of American Metal Climax, Inc., 1270 Avenue of the Americas, New York 20, N.Y.

EDITORIAL PAGES OF LEADING TRADE MAGAZINES FEATURE MoS_2 INFORMATION

Higher temperatures, lower temperatures, greater pressures, longer lubrication life, all have combined to focus more attention on the uncommon lubricating values of molybdenum disulphide.

That's why editors are devoting more and more space to descriptions of what MoS_2 can and cannot do.

One article tells how MoS_2 prevents harmful friction in brake linings. Another discusses its use as a compressor lube substitute. Still another reports on tests of epoxy-resin compositions containing high concentrations of MoS_2 for industrial use on bearings, seals and friction strips.

Press fittings, wire drawing, cutting tools, ball joints—there are MoS_2 stories about these uses, too.

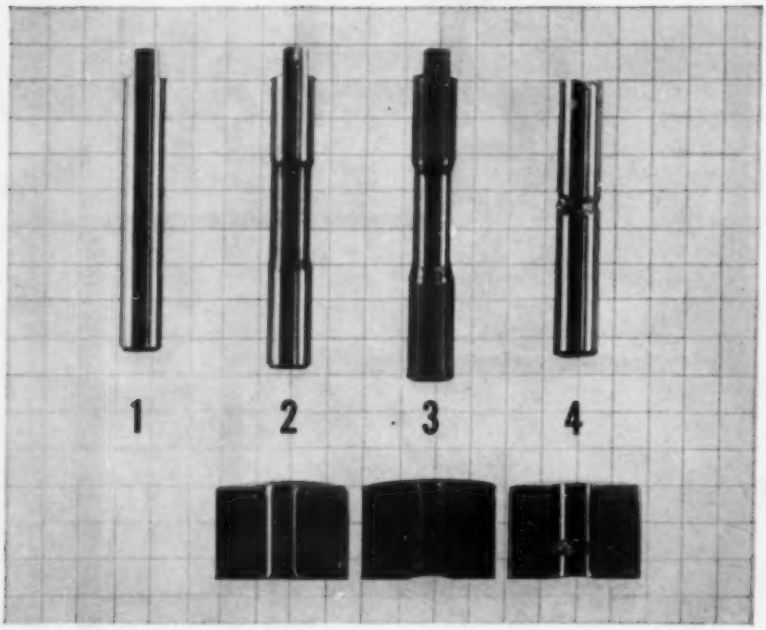
MoS_2 as a solid-film dry lubricant has been the subject of several articles. One details high-temperature properties; another describes a new bearing design that can increase bearing life as much as 450%.

Write us for a complete bibliography of published material on molybdenum disulphide.

P.S. Climax publishes a newsletter that describes even more uses. Let us know if you'd like your name on the mailing list.

Circle 505 on postcard, page 33

Proof of MoS_2's High-Pressure Properties



Photograph above shows mild steel test pins. No. 1: Unused pin, No. 2 (lubricated with mineral oil and Molysulfide) and No. 3 (with Molysulfide bonded coating) were subjected to rotating pressures between bearing halves. Both were elongated and extruded without galling, seizing, or weight loss. No. 4 shows typical failure with conventional lubricant. Note that the key sheared off and pin and block were galled and seized.

Circle 506 on postcard, page 33

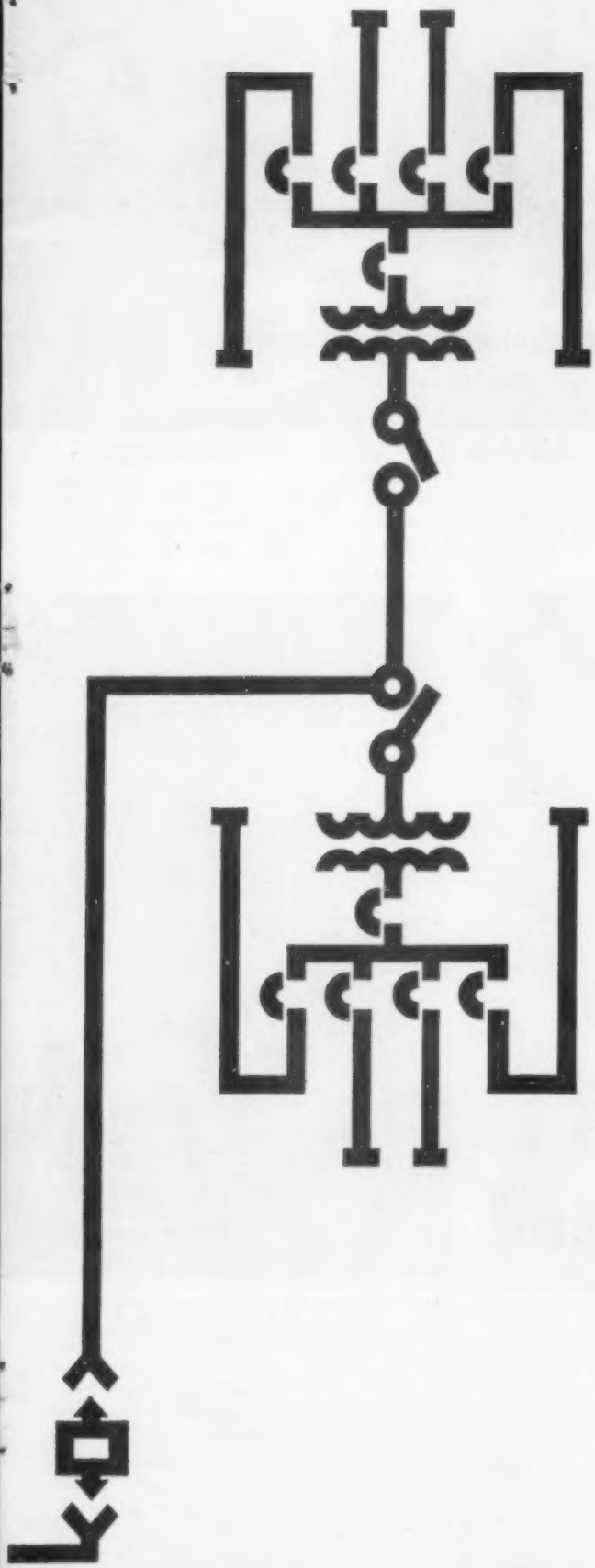
ASME SHOW DEVOTES SESSION TO "MOLY" LUBES

New evidence of mounting interest in molybdenum disulphide was shown recently among members of the American Society of Mechanical Engineers. A spokesman for the Climax Chemical Division was invited to speak on "Molybdenum Disulphide as a Lubricant" before the Machine Design Division at the 1961 Design Engineering Conference. A copy of this 24-page paper is available on request.

At the same meeting, engineers from Socony Mobil Oil Company spoke on "Molybdenum Disulphide as an Additive to Improve the Performance of an Automotive Multi-purpose Grease." Write to Climax for a copy of this paper.

Circle 507 on postcard, page 33

J-94174-1



Baptist Operations Building powers up to process 200 carloads of church literature yearly

In the nine-building complex that forms the Baptist Sunday School Board Headquarters in Nashville, Tenn., a new $5 million Operations Building is the hub of activity, forwarding books, pamphlets and supplies to the denomination's nine million members.

These pages show how Westinghouse helped assure electrical power adequate for present operations, with equipment designed to meet requirements for planned office space expansion. Another reason why you can be sure . . . if it's Westinghouse.

J-04174-2

Operations Building
Baptist Sunday School Board
Nashville, Tennessee

(*continued*)

Owner: Sunday School Board of the Southern Baptist Convention, Nashville, Tenn.
Architects and Engineers: Hart, Freeland and Roberts, Nashville.
General Contractor: W. F. Holt and Sons, Nashville.
Electrical Contractor: Bond Electric, Nashville.
Electrical Distributor: Tafel Electric and Supply Co., Nashville.

C. R. Marshall (standing), Westinghouse, describes future capabilities of the electrical system to: E. B. White, Architect; James L. Sullivan, Executive Secretary-Treasurer, Sunday School Board; B. B. Boyd, Jr.,Consulting Electrical Engineer; Hardie Bass, Chief Architect for the Sunday School Board. Westinghouse helped coordinate electrical construction to insure economical future growth. Eventual expansion will add three production floors and a 12-story office annex.

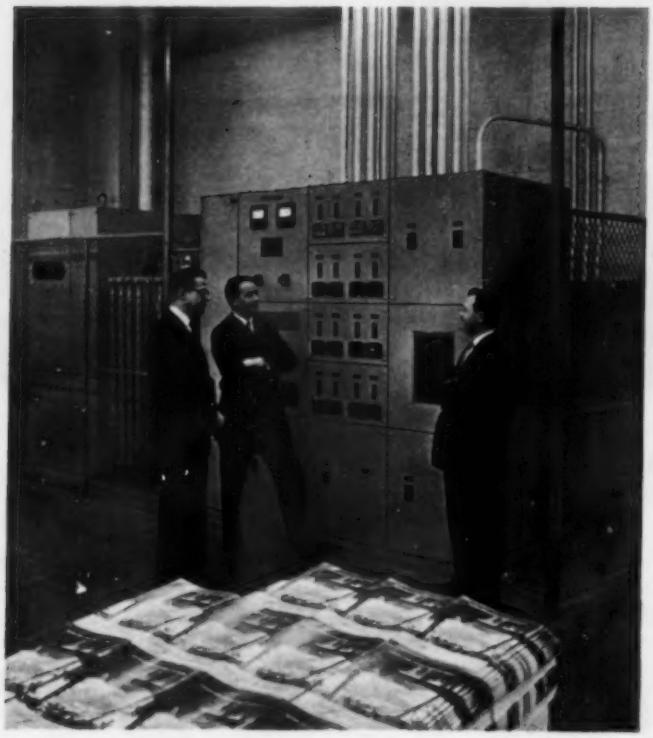
J-94174-3

Lighting the main office area are 265 Westinghouse Type LC fluorescent luminaires. In this installation the fixtures are suspended from the ceiling; they can be surface mounted if desired. Metal side panels allow for easy maintenance and give a pleasing appearance, and the 35° by 25° metal louvers assure uniform brightness across the luminaire.

Discussing primary 5-kv indoor metal-clad switchgear, Hardie Bass, E. B. White and B. B. Boyd, Jr. Switchgear contains four 50-DH-75 air circuit breakers for feeders to the five power centers and HV starters. Draw-out construction of the Westinghouse unit allows for quick, simple withdrawal of the breaker element for inspection of contacts.

Motor Control Center conveniently groups all controls. William H. Donnell, Maintenance Supervisor, Sunday School Board; W. A. Cortner, Bond Electric, and J. R. Harrell, Tafel Electric, discuss two Ampgard® 2300-volt linestarters, at left, which control and protect 360-hp motors. Sections at right house 208-volt motor control.

W. A. Cortner and J. R. Harrell examine a Westinghouse column-type NLAB lighting panelboard. Quick-lag breakers in the panel give protection against both short circuits and overloads. Pull-box at the top makes connections easier, installation faster, neater.



As diagrammed on the previous pages, five unit power centers rated 2300 to 120/208 wye are strategically positioned to provide LV power at point of use. Seen at the low-voltage end of this 500-kva power center are B. B. Boyd, Jr., J. R. Miller, Westinghouse Construction Engineer, and J. R. Harrell. Tri-pac feeder breakers are used here to protect against high fault currents. Tri-pac combines AB De-ion circuit breaker and a current limiting device for use with fault currents up to 100,000 amps. Typical church literature can be seen in the foreground.

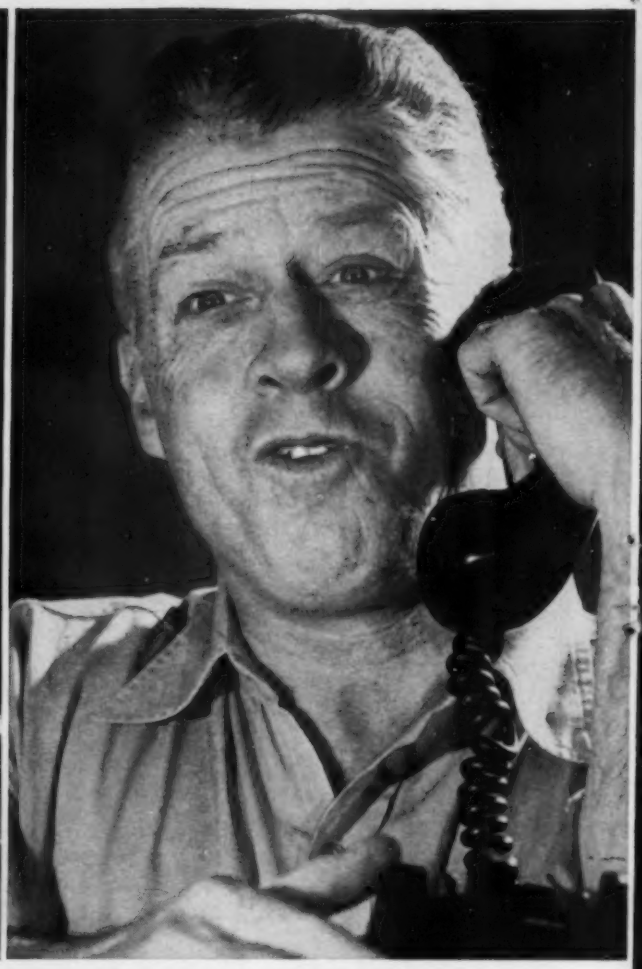
W. A. Cortner energizes a Westinghouse Lifeline Starter controlling a 5-hp air conditioning motor. Starter is operated easily with a start-stop push button mounted on the cover. At right is a 30-ampere 250-volt fusible safety switch with a quick break mechanism that prolongs contact life, gives years of trouble-free service.

J-94174-4

Westinghouse

GOODYEAR

Why not buy hose



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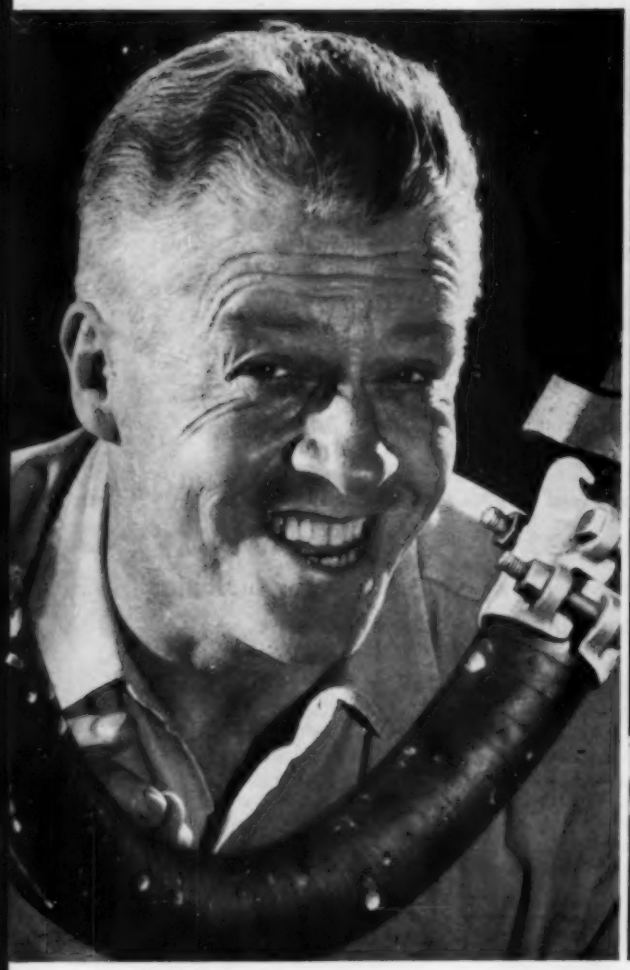

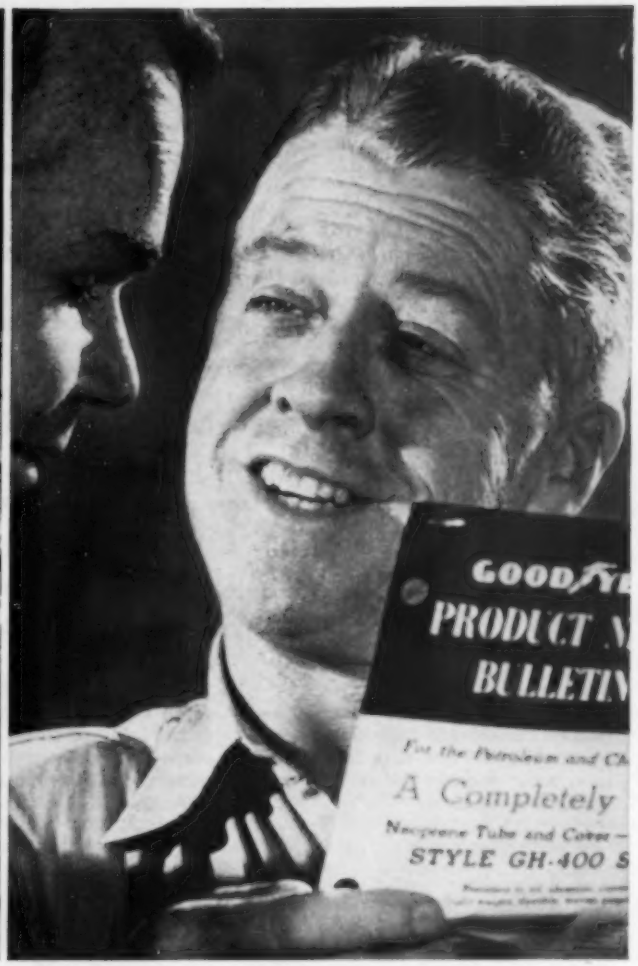

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GOODYEAR INDUSTRIAL PRODUCTS

Circle 509 on postcard, page 33

HELPFUL WATER CONDITIONING DATA FROM BETZ

HOW TO EXTEND COOLING

The deterioration of cooling tower wood by chemical, biological and physical factors shortens the life of cooling towers.

OVER THE PAST DECADE considerable attention has been focused on the problem of cooling tower wood deterioration—and for good reasons. Complete collapse of some cooling towers has occurred. In other cases, fan supports have deteriorated, and the fans have fallen through the tower. Accidents have occurred due to collapse of ladders, decking and other parts of the tower. Wood deterioration has shortened the life of cooling towers from the anticipated 20-25 years to 10 years or less in many cases. Repairs and replacement costs have been excessive, and cooling tower operation has been inefficient. During the past decade, many organizations have been engaged in a study of the problem to determine the causes and possible cures. Since water is an intimate part of the problem, Betz Laboratories is actively engaged in the study of wood deterioration.

Cooling Tower Wood Composition

Redwood is the most commonly used material for cooling tower construction. It has been in use for this purpose almost since the advent of cooling towers themselves. Originally, this material was selected because of high strength to weight ratio, ready availability, ease of fabrication, cost and natural resistance to decay. Other species are used for this purpose, particularly Douglas Fir and less frequently cypress and pine.

Wood is composed of three main components; cellulose, lignin and natural extractives. The cellulose exists as long fibers almost identical to cotton fibers, and gives wood its strength. The lignin acts as the cementing agent for the cellulose. The extractives contain most of the natural compounds which contribute to the resistance to decay. In general, the more highly colored woods are the more durable. A typical analysis of redwood, based on the dry weight, will show approximately 50% cellulose and hemi-cellulose, 30% lignin and 20% extractives. The extractives present in redwood make this material one of the most resistant to decay. Unfortunately, the extractives present in all woods are largely water soluble, and will be leached from the wood by the circulating water. The strength of the lumber does not appear to be affected by leaching. However, the wood does become more susceptible to decay.

Types of Wood Deterioration

Cooling tower wood is subject to three main types of deterioration; chemical, biological, and physical. It is rare where one of these types of deterioration is present without the other. In most cases these different types of deterioration occur simultaneously. When deterioration occurs it is difficult to determine which type of attack is predominately responsible. However, it is evident that physical and chemical deterioration will render the wood more susceptible to biological attack.

Chemical Attack

Chemical deterioration of cooling tower wood commonly is manifested in the form of delignification. Since the lignin component of the wood is affected and removed by this type attack, the resultant residue is rich in cellulose. The chemicals most commonly responsible are oxidizing agents such as chlorine, and alkaline materials such as sodium bicarbonate and sodium carbonate. *The attack is particularly severe when the combination of high chlorine residuals and high alkalinity concentrations are maintained simultaneously.*

Brash, checked wood.

Typically the wood takes on a white or bleached appearance, and the surface becomes fibrillated. This attack is restricted to the surface of the wood and the strength of the unaffected area is not impaired. However, severe thinning of the wood will occur wherever cascading water has an opportunity to wash away the surface fibers. In serious cases, the loosened fibers have caused plugging of the screens and tubes, and have served as focal points for corrosion at areas where the fibers accumulate in heat exchange equipment.

Chemical attack most frequently occurs in the fill section and flooded portions of the tower where water contact is continuous. However, it will occur also in those areas where alternately wet and dry conditions develop—such as on the air intake louvers and other exterior surfaces. Chemical attack occurs also in the warm, moist areas of the plenum chamber of the tower caused by chlorine vapors and entrainment of droplets of tower water.

Biological Attack

Biological attack of cooling tower wood can be divided into two basic types . . . soft or surface rot and internal decay. These two types of deterioration are characterized by the effect they produce. *In general, biological attack is insidious. It can proceed relatively unnoticed for long periods of time and then can manifest itself suddenly . . . and disastrously.*

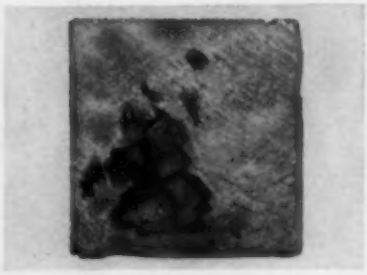
The organisms that are responsible for attack of cooling tower wood are those that can utilize cellulose as their source of carbon in their growth and development. Degradation of the cellulose is accomplished by the secretion of enzymes which convert the cellulose into compounds that can be absorbed by the organisms. The attack tends to deplete the cellulose content of the wood and leaves a residue rich in lignin. Characteristically, the wood becomes dark in color and loses much of its strength. The wood also may become brash, soft, punky, cross-checked or fibrillated. The principal cellulolytic organisms isolated from cooling tower wood are primarily fungi, which include the classical wood destroyers (Basidiomycetes), and members of Fungi Imperfecti. However, bacterial organisms that exhibit cellulolytic properties also have been isolated but their exact role in cooling tower wood deterioration is yet to be determined. The wood destroying organisms are common air and water borne contaminants, and are widely distributed in nature.

The classical *internal decay* is restricted generally to the plenum areas of the tower, such as the cell partitions, doors, drift eliminators, decks, fan housing and supports. It is the more insidious of the two types of biological attack. It is characterized externally by an apparently sound piece of wood, which upon breaking shows severe in-

ternal decay. Because the decay is internal, it is difficult to detect in its early stages. Rarely is internal decay found in the flooded portions of the tower such as the fill section. In these sections, the wood is saturated completely with water which excludes oxygen from the interior of the wood. The absence of oxygen limits the growth and development of these organisms.

Soft or surface rot is found predominantly in the flooded sections of the tower but also occurs in the plenum areas. The water flowing over the wood surfaces in the flooded portions contains enough oxygen to support growth. Surface rot is detected more readily, and its effect is less severe than internal decay.

In addition to oxygen—moisture and temperature have a marked bearing. Locations where the moisture content of the wood range between 20 and 27% and temperatures range between 88 and 105 F, usually permit optimum growth and development of the organisms.



Internal biological attack.

Chemical deterioration as manifested by delignification can be controlled readily by restricting the pH and chlorine concentration of the circulating water. It is advisable to restrict the pH below 8.0 and preferably in the range of 6.0-7.0. In this range, the alkaline salts will be at a low level, the rate of leaching of extractives will be slower and the adverse effect of chlorine will be lower. It is also advisable to restrict the free chlorine residual to no more than 1.0 ppm, or preferably lower. Intermittent chlorination is preferred over continuous chlorination, since the latter even at concentrations less than 1.0 ppm tends to promote more rapid deterioration of tower wood.

Biological deterioration of the surface type, particularly in the flooded portions of the tower, can be greatly minimized by the same factors which minimize chemical attack. There is ample evidence that chemical surface attack renders the wood more susceptible to biological surface attack. In addition to the control of pH and the judicious use of chlorine, the supplemental periodic addition of non-oxidizing biocides to the circulating water to control the causal organisms will be of material benefit.

The control of biological deterioration in the plenum areas of the tower is considerably more complicated, primarily because of the internal decay which is prevalent in these areas. *This type attack can proceed relatively unnoticed for long periods of time and then can manifest itself suddenly—and disastrously.* This statement is repeated to emphasize the insidious nature of this type attack. Thorough inspections will not always disclose the extent or presence of incipient decay. Detection is made generally only after extensive damage has been done. Infected members should be removed and replaced preferably with 'treated' lumber. Because of the random nature of the attack, and the fact that only the most seriously affected areas will be discovered and replaced, subsequent discovery of more areas of infected lumber will be uncovered with time, and maintenance and repair costs will mount.

The existing methods of control of biological deterioration in the plenum areas of operating towers involves spraying the lumber with preservatives that are toxic to the causal organisms. Impregnation of the wood relies on diffusion of the toxicants into the wood. Whereas diffusion of the toxicants through the ends of the wood members is good, diffusion across the grain is not very great, often limited to penetration of the outer ⅛″ to ¼″ of the member. In large members, where the internal rot is deeply seated, the toxicant will not reach the infected area and growth of the organisms can continue. Accordingly, at best the procedure of spraying the plenum areas of the tower can only help in containing the infection. *Because of this limitation it is essential that the corrective procedure be applied before the tower is seriously infected.* Therefore, for maximum benefit in minimizing biological attack of the internal type, spraying of the plenum areas of the tower should be done before serious infection has developed. The spray procedure should be adopted and viewed as preventive maintenance.

In order that serious attack be avoided, periodic examination of the tower should be augmented by submitting wood samples to a qualified microbiological laboratory. Studies of the wood can be made which will show the incidence of fungi on the surfaces and interior sections of the wood and whether cellulolytic organisms were or are present. The natural resistance of the wood should be checked to determine whether it has diminished to a point where it is no longer effective against microbiological attack. These studies can serve as a basis for determining when to initiate the preventive spraying program.

TOWER LIFE

Physical and Other Factors

One of the major physical factors is the effect of temperature upon wood. Wood technologists have long recognized that high temperatures have an adverse effect on wood. It is known that continuous exposure to high temperatures will produce gross changes in anatomical structure and will accelerate loss in wood substance. These resultant effects will weaken the wood and predispose it to biological attack particularly in the plenum areas of the tower.

There are other factors which also have a bearing on the deterioration of tower wood. For example, areas adjacent to iron nails and other iron hardware usually deteriorate at an accelerated rate. These areas invariably lose much of their strength and the wood will crumble easily in the fingers. Slime and algae growths and deposition of dust and oil can all aid the growth and development of the soft rot organisms.

Control of Wood Deterioration

While the subject of wood deterioration under cooling tower operating conditions is far from being completely understood, a considerably better understanding of the process has been gained during the last few years. With this understanding, a comprehensive program can be outlined which, if followed, will assure a minimum of attack and longer tower life.

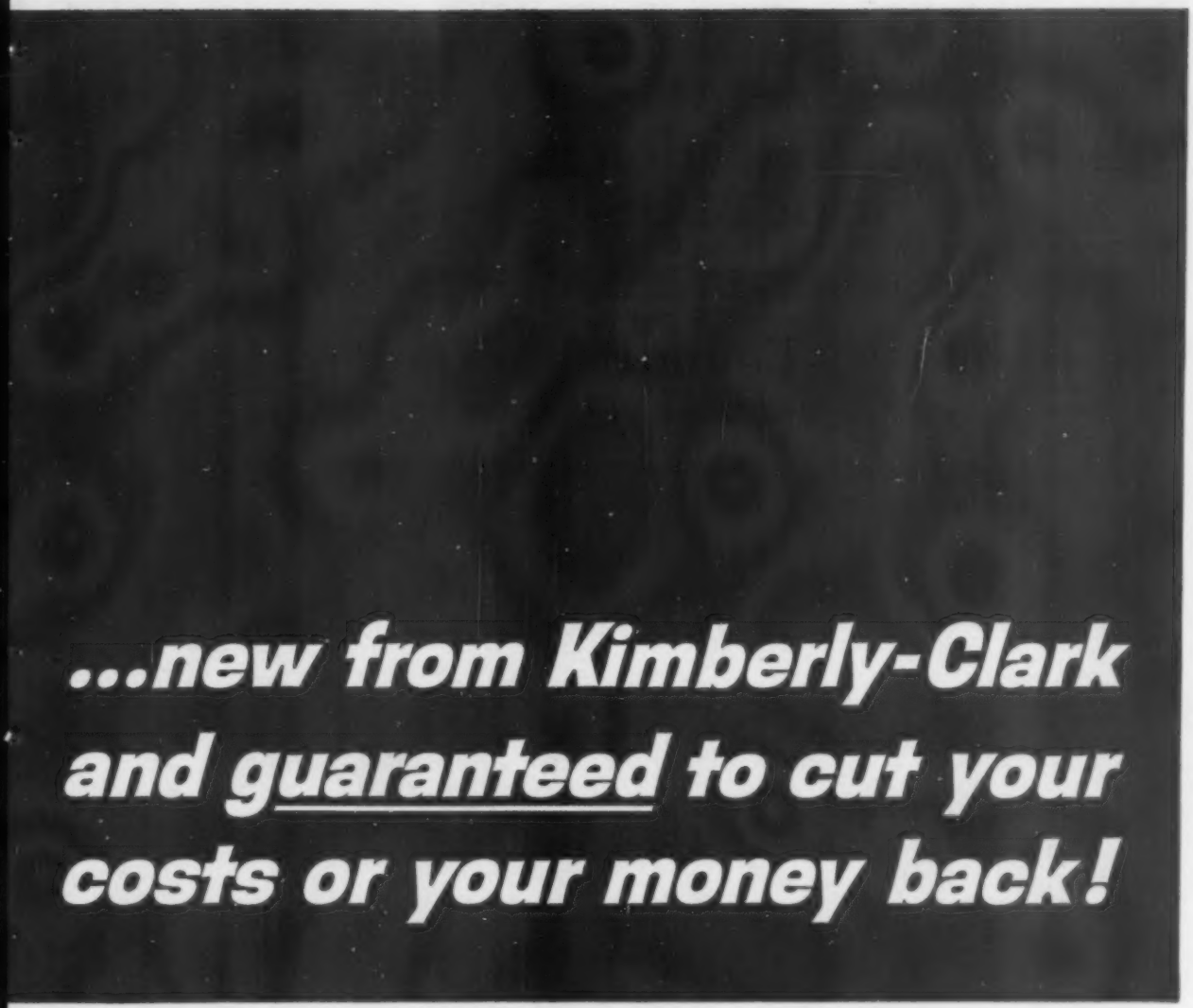
Betz Laboratories maintain a well equipped microbiological laboratory, staffed by microbiologists with an extensive background in the field of cooling tower wood deterioration. We will be pleased to make our facilities and services available for the study of your cooling tower problems. For more details on the care and maintenance of cooling tower wood deterioration, write for Bulletin 605.

BETZ LABORATORIES, INC.
Gillingham & Worth Streets • Phila. 24, Pa.

BETZ

■ CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

Kimtowels®
DISPOSABLE SHOP TOWELS



...new from Kimberly-Clark and guaranteed to cut your costs or your money back!

Your towel costs must come down or your money back!

Kimberly-Clark's 1-month guaranteed cost-cutting plan will prove to you that KIMTOWELS can reduce wiping costs. Here's how the plan works: you order a month's supply of Kimtowels. Use them in your entire plant (or in a single department) just as you would cloth wipers. At the end of one month, if your wiping costs haven't gone down, we will gladly refund the cost of the Kimtowels. Fair enough? Send coupon today.

- Look, feel, perform like cloth!
- Usable—over and over!
- Far more economical than cloth!
- Strong, rugged—wet or dry!

plus—no rental; no collecting; no sorting; no storage; no records; no pilferage!

Kimberly-Clark Department No. PE-111, Neenah, Wisconsin

At no obligation to me, please rush information on Kimtowels "GUARANTEED COST-CUTTING PLAN."

Name.....

Firm.....

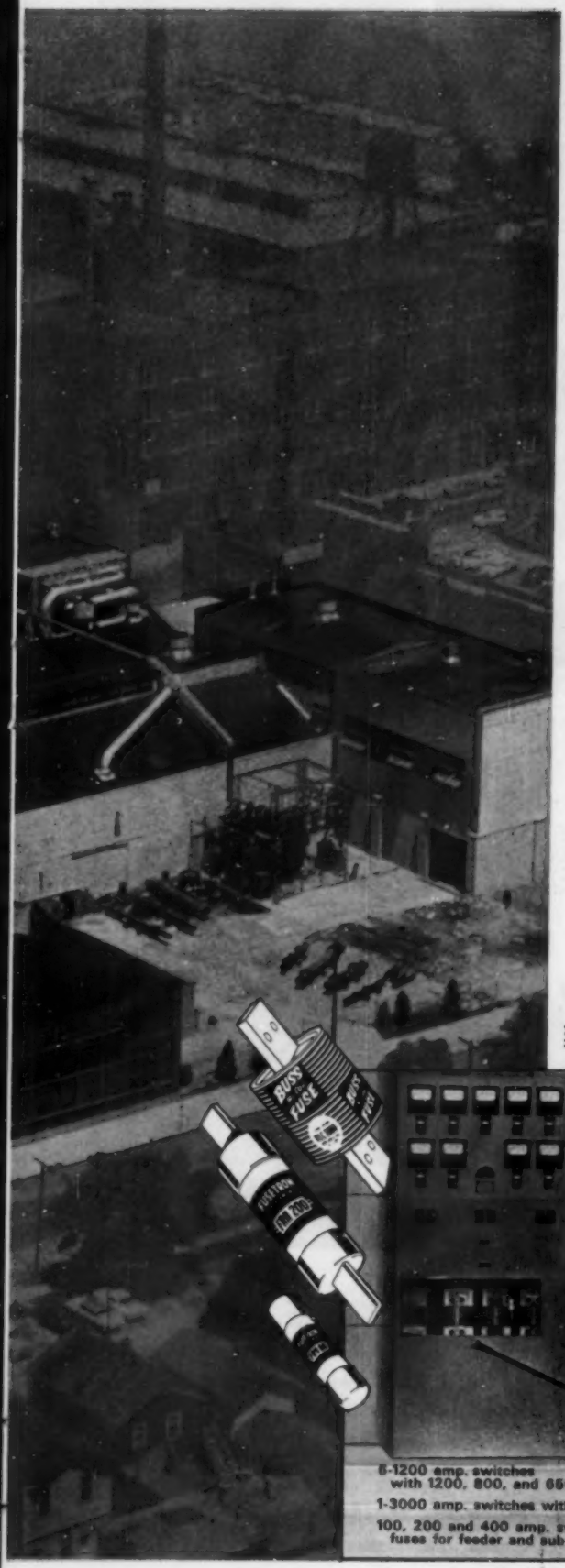
Street.....

City.....Zone.....State.....

Circle 511 on postcard, page 33

Electrical Protection goes MODERN with BUSS Fuses . . .

at Sandusky Foundry & Machine Co.
Sandusky, Ohio



THIS ALL FUSE INSTALLATION PROVIDES NEEDED HIGH INTERRUPTING CAPACITY—AND SAVED AN ESTIMATED $20,000

A new electrical system was installed at the Sandusky Foundry and Machine Co., to feed a 1000 KVA annealing furnace and plant feeders and sub-feeders.

The engineers at Universal Marine Construction Co., Sandusky, Ohio who designed and installed the job, estimated the available fault current would be in the neighborhood of 75,000 amperes.

To be sure of obtaining the needed safe and dependable protection BUSS Hi-Cap and FUSETRON dual-element fuses were installed.

DEPENDABLE PROTECTION AT A $20,000 SAVING

Including the cost of fuses and switches, an estimated $20,000 was saved over what it would have cost to use mechanically operated devices with an interrupting rating of only 75,000 amperes.

This BUSS and FUSETRON fuse installation also permitted the electrical system to be co-ordinated, so outages on feeder and sub-feeder circuits can be limited to the circuit on which trouble occurs.

ELECTRICAL SYSTEM NOT DISTURBED WHEN TRANSFORMER CAPACITY WAS INCREASED

Shortly after the original installation, additional transformer capacity was added,—bringing the available fault current to approximately 150,000 amperes.

No change in the main service panels was needed, however, as the 200,000 amp. interrupting capacity of BUSS Hi-Cap fuses is still adequate to assure safe protection.

Neither was a change required in the protection of feeder circuits because FUSETRON fuses have adequate interrupting capacity to safely handle any fault that might occur on them.

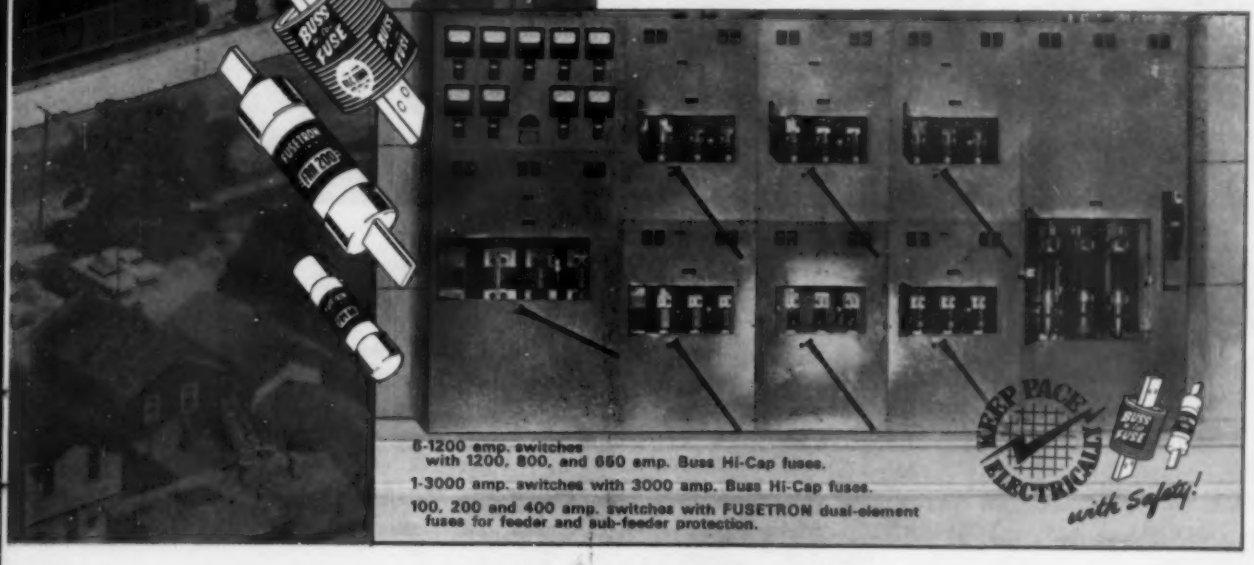
SAFE PROTECTION REMAINS SAFE

After years of inactivity, BUSS Hi-Cap and FUSETRON fuses provide the same safe, accurate protection if called upon to open as they would on the day installed. Dust, fumes, corrosion or age cannot increase the capacity of fuses or lengthen their blowing time.

For more information on how to select the proper fuse, write for the new BUSS booklet . . . *Basic Protection for Electrical Power Systems.*

BUSSMANN MFG. DIVISION, *McGraw-Edison Co.,* **ST. LOUIS 7, MO.**

1161



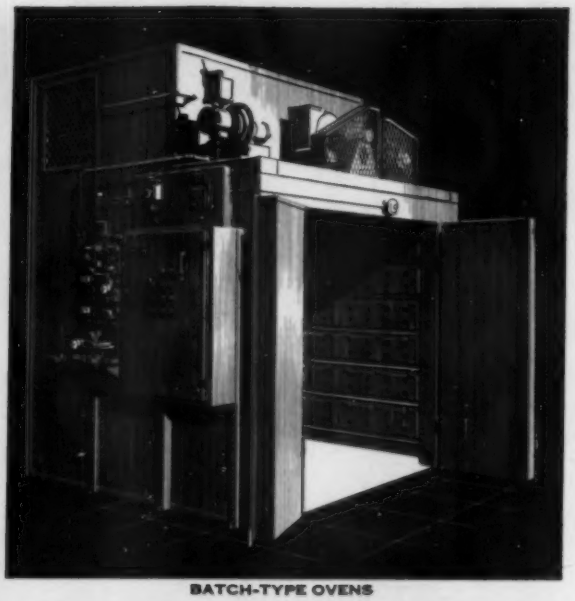
6-1200 amp. switches with 1200, 800, and 650 amp. Buss Hi-Cap fuses.

1-3000 amp. switches with 3000 amp. Buss Hi-Cap fuses.

100, 200 and 400 amp. switches with FUSETRON dual-element fuses for feeder and sub-feeder protection.

Circle 512 on postcard, page 33

SPRAY GUNS

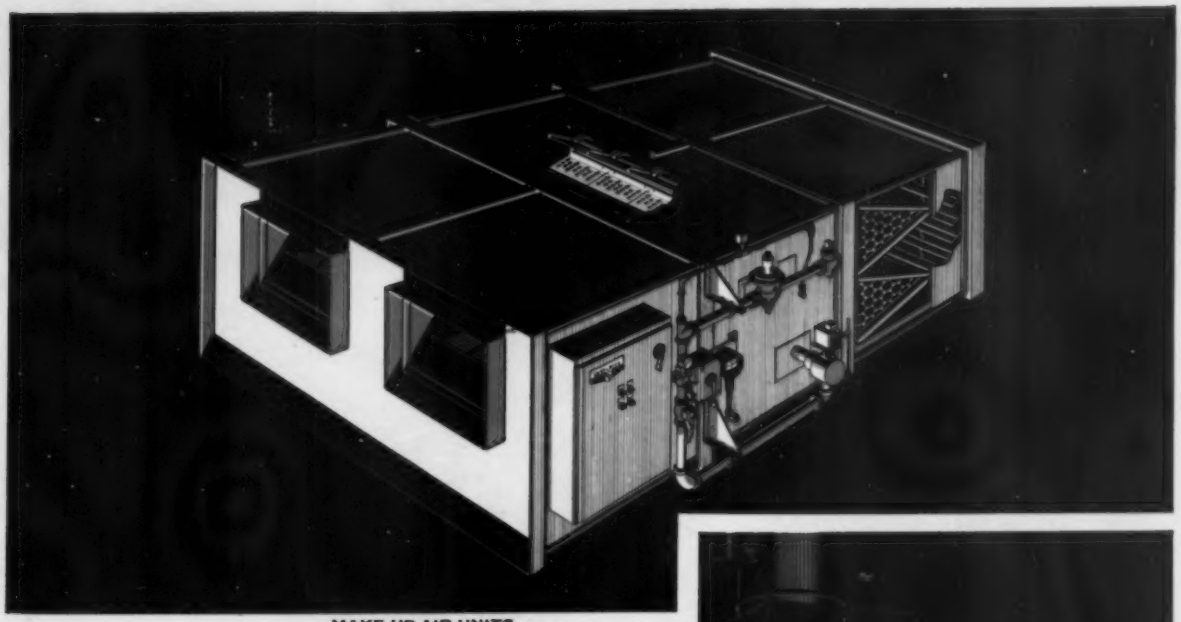


BATCH-TYPE OVENS

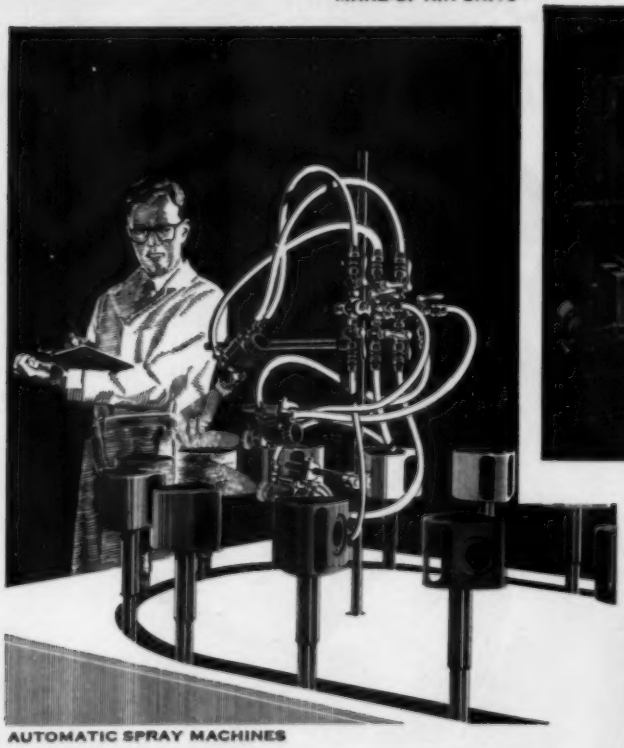
POWER SPRAY WASHERS

DUST COLLECTORS

DeVilbiss' complete line of equipment assures maximum performance and value for every coating dollar you invest. Whether you need individual units, matched components, or completely engineered finishing systems, DeVilbiss can deliver the goods. Only DeVilbiss designs, manufactures, installs, services and guarantees *all* major types of coating equipment. Our complete line—backed by testing, training and technical help—means Total Service. It's the service you've come to expect and the service you get—from DeVilbiss. Check the Yellow Pages for your nearest DeVilbiss representative.



MAKE-UP AIR UNITS



AUTOMATIC SPRAY MACHINES

SPRAY BOOTHS

AIR COMPRESSORS

FOR TOTAL SERVICE, CALL

DEVILBISS

DeV

THE DeVILBISS COMPANY, Toledo 1, Ohio.
Also Barrie, Ontario; London, England; São Paulo, Brazil. Branch offices in principal cities.

Circle 513 on postcard, page 33

by the hundreds
and no stops for greasing!

step up production

with Lincoln automatic lubrication

Automated lines run smoother, faster when each bearing gets its lubricant automatically. Take cans. A few years ago 300 cans per minute was considered a fine rate. Now if you don't get over 600 you're losing out.

Automatic lubrication makes a definite difference in your production rates. A bearing that gets a small, measured amount of grease every 15 minutes runs cooler and smoother than one that gets a big gob every eight hours. It holds up longer, and knocks out the biggest cause of unscheduled downtime . . . bearing burnout. You also use less lubricant and less power, and the smoother run reduces rejects.

Whether you build or buy machinery, you protect your investment with a Lincoln automatic lubrication system.

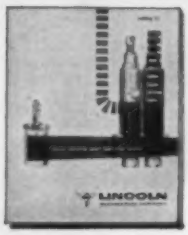
WHEN YOU THINK OF LUBRICATION...THINK OF LINCOLN

LINCOLN

ENGINEERING COMPANY

ST. LOUIS 20, MO. • DIVISION OF THE McNEIL MACHINE & ENGINEERING CO.

SEND COUPON FOR NEW CATALOG



LINCOLN ENGINEERING CO.
Dept. PE-11
4010 Goodfellow Blvd., St. Louis 20, Mo.

☐ Please send me your new Catalog 82 on Lincoln centralized lubrication systems.

Name _____

Firm _____

Address _____

City _____ Zone _____ State _____ 16116

Circle 514 on postcard, page 33

New from Westinghouse

QCC 200 amp breakers ½ cost ½ size ½ weight of conventional breakers

From Westinghouse comes a complete new line of circuit breakers designated type QCC which are just ½ the cost, size and weight of conventional 200-amp breakers. They are designed for service entrance use up to 240 volts a.c. and 10,000 amps maximum interrupting capacity rating.

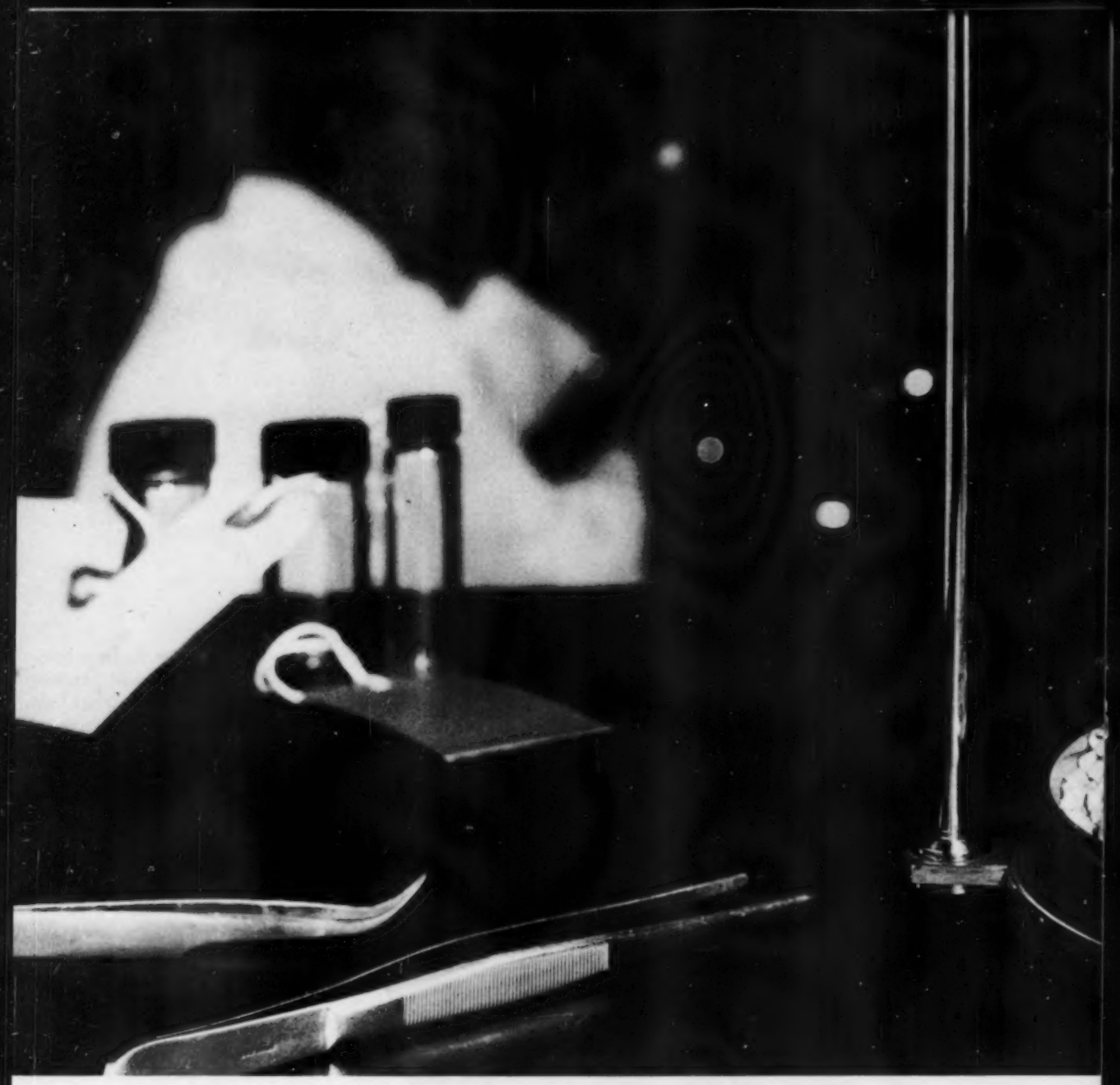
Although economically priced, Westinghouse QCC Breakers include the quality features of De-Ion arc quenchers, a quick-make, quick-break over center toggle mechanism, and thermal magnetic trips.

For more information contact your Westinghouse representative, Westinghouse distributor, nearest independent panelboard-switchboard builder, or write Westinghouse Electric Corporation, Standard Control Division, Beaver, Pa. *You can be sure . . . if it's Westinghouse.*

1 POLE 120/240v. | 2 POLE 120/240v. | 2 POLE 240v. | 3 POLE 240v.

Westinghouse

Circle 515 on postcard, page 33



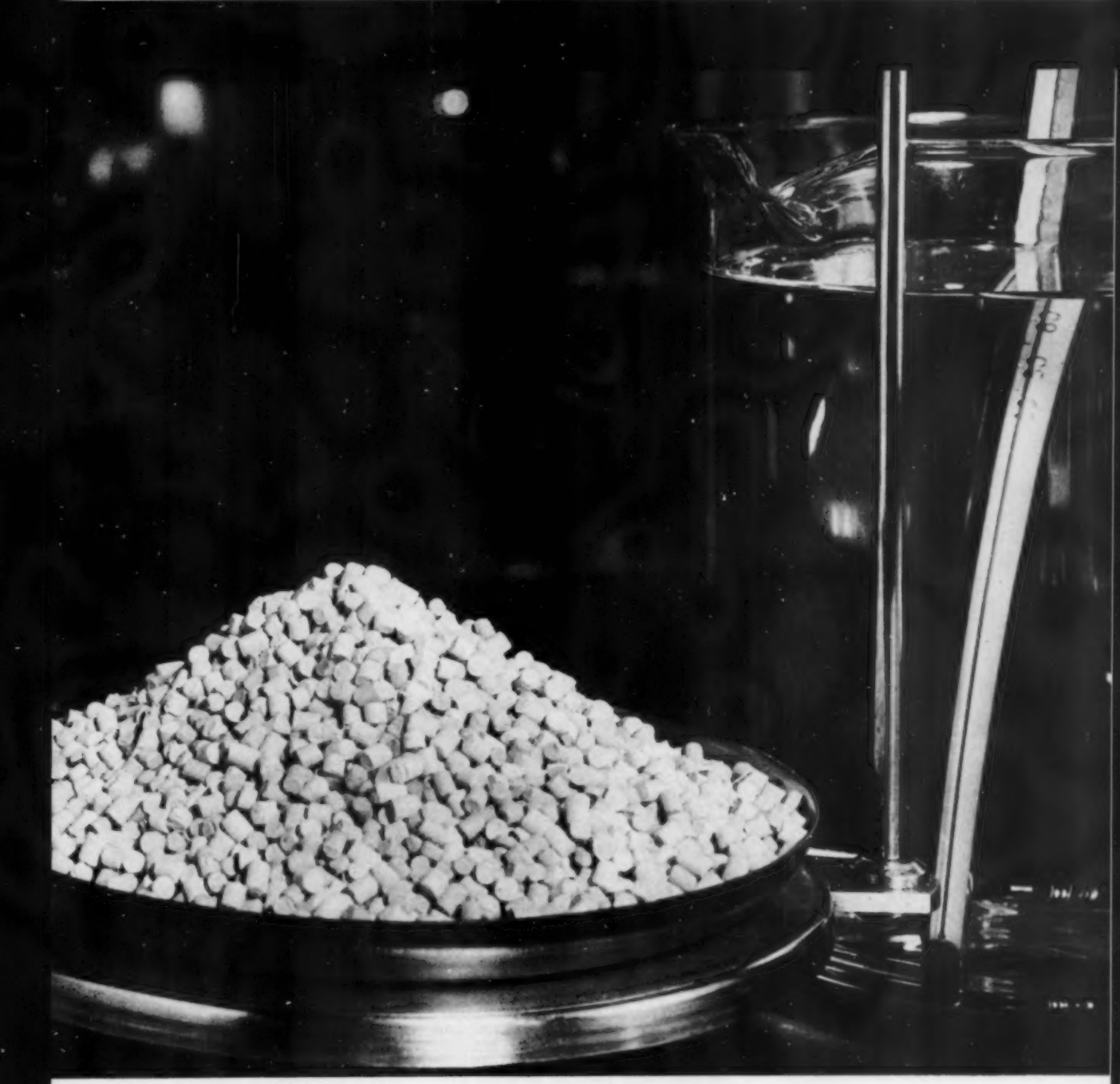
New Gulf process makes Gulf Harmony®

GULF MAKES THINGS

You're looking at a new catalyst (the tiny pellets). It's the heart of Gulf's new hydrogen treating process, called Gulfinishing, used to super-finish Gulf Harmony Oil. It replaces the conventional clay treating operations previously needed to finish base stocks for this product. It makes Gulf Harmony a superior, versatile oil capable of handling a number of plant lube and hydraulic assignments. Here's how.

Gulfinishing removes more undesirable compounds than any other finishing process. It not only scrubs a base stock clean, it converts weak molecules to stable ones. It greatly improves the response of the base oil to the oxidation inhibitor. This improved response means greater stability; better protection against sludge formation; longer service life.

Improved Gulf Harmony continues to provide the



a superior oil for plant equipment . . .

RUN BETTER!

effective protection against rusting and foaming for which it has always been recognized.

Wouldn't you like to learn more about improved Gulf Harmony? Find out what it can do for your plant equipment and prove to yourself that Gulf makes things run better! Consult the Gulf catalog in Sweet's Plant Engineering file for the address of your nearest Gulf office. Or write for free brochure.

GULF OIL CORPORATION
Dept. DM, Gulf Building
Houston 2, Texas

GULF

Circle 516 on postcard, page 33

CHEMPRO SQUARE-BRAIDED TEFLON* PACKINGS

Chempro Square-Braided Teflon Packings are tough, strong and chemically inert. They outlast ordinary braided packing many times over, holding together longer against even the strongest acid, alkali or organic solvent. Here are four popular Chempro Square-Braided Teflon packings:

STYLE No. 400 PACKING Constructed of pure Chempro tape, braided square without lubrication. For highly corrosive services where a lubricant is undesirable.

STYLE No. 400-F PACKING Resilient, square-braided packing of Chempro Teflon multi-filament yarn, without lubrication. For pump and valve applications in highly corrosive services where the packing must "give" to a certain extent.

STYLE No. 400-FI PACKING Square-braided packing of Chempro Teflon multi-filament yarn and impregnated with Teflon suspensoid. This dense packing was developed for gas and vapor services where other lubricated packings were not acceptable.

STYLE No. 400-FL PACKING Made by square braiding Chempro Teflon multi-filament yarn and externally lubricating with a non-hardening and non-melting lubricant. Recommended for high speed applications and highly corrosive services, from freezing to 350° F.

These Chempro Braided Teflon packings are available in all sizes in standard 1/16" increments from 1/8" to 3/4" square—in spool or coil forms. Can be cut to specific ring sizes, if desired.

Write for revised Bulletin CP-552.

*duPont trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N. Y.

Circle 517 on postcard, page 33

BACKTALK AND FORETHOUGHTS

Edited by Bea Berghorn

1959 Tear Sheets Still In Demand

PLANT ENGINEERING:

"In your August, 1959 issue you had a paper titled, 'How To Field-Balance Fan Wheels, an outline of Recommended Procedure' by A. M. Wilbur, Manager, Service Department, American Standard Industrial Division, Detroit, Michigan. We have found this paper very useful, but have somehow lost our original copy.

"I would appreciate your sending me two copies of this article." *John R. Farkas, Production Engineer, Ansco, Div. of General Aniline and Film Corp., Binghamton, N. Y.*

Building Aids

PLANT ENGINEERING:

"Please send to the attention of the library one copy each, reprints from PLANT ENGINEERING, September issue: 'Preliminary Planning', page 104 and 'Design for Expansion' page 111." *Lucy Schotter, Librarian, Middle West Service Co., Chicago, Ill.*

Words We Like To Hear

PLANT ENGINEERING:

"Kindly send me a full set of tear sheets on the 'Construction Specifications' articles written by Mr. R. E. Wallin. These articles are very well written and should be very useful guides to new construction." *William F. Knop, General Maintenance Engineer, Baltimore Urban Renewal and Housing Agency, Baltimore, Md.*

■ The article referred to is the five-part Construction Specifications that appeared in PLANT ENGINEERING, August through December, 1958. The five parts include: General Conditions; Taxes, Payments Arbitration and Guarantees; Taking Construction Bids; Analyzing Bids, Signing the Contract; and Progress Reports, Final Inspection. This reprint is available for $2.00 per copy, from the Editor, PLANT ENGINEERING.—*Editors.*

More Preventive Maintenance

PLANT ENGINEERING:

"Would you please mail to me any information you have available, from past articles in PLANT ENGINEERING, on preventive maintenance programs.

"I am mainly interested in programs utilizing a card system employed to schedule periodical maintenance to plant equipment such as air compressors, aftercoolers, cooling towers, conveyors, etc.

"However, any information you may have available in regards to preventive maintenance programs will be greatly appreciated." *A. H. Grava, General Foreman, Maintenance, Chevrolet-Detroit Gear and Axle, Div. General Motors Corp., Detroit, Mich.*

PLANT ENGINEERING:

"Please send two copies of your article 'Managing a PM Program' from the July issue of your magazine. I would appreciate any other information relative to initiating and operating a PM program." *George M. Kennedy, Manager, Industrial Engineering Dept., The Pillsbury Co., Springfield, Ill.*

■ We have sent several tear sheets and/or reprints of articles on preventive maintenance and trust they will prove helpful.—*Editors.*

Filters Again!

PLANT ENGINEERING:

"We will be glad to receive five tear sheets of the article 'Cloth Dust Filters', which appears on pages 92 through 97 of the August issue of PLANT ENGINEERING." *M. C. Cassidy, Librarian, The Harshaw Chemical Co., Cleveland, Ohio.*

Calls for Sulfamic Acid

PLANT ENGINEERING:

"Reference to your article appearing in PLANT ENGINEERING, entitled 'In-Place Acid Cleaning—Safe and Easy' by Gallinger. I'd like to take advantage of your offer of a free sample of Du Pont sulfamic acid.

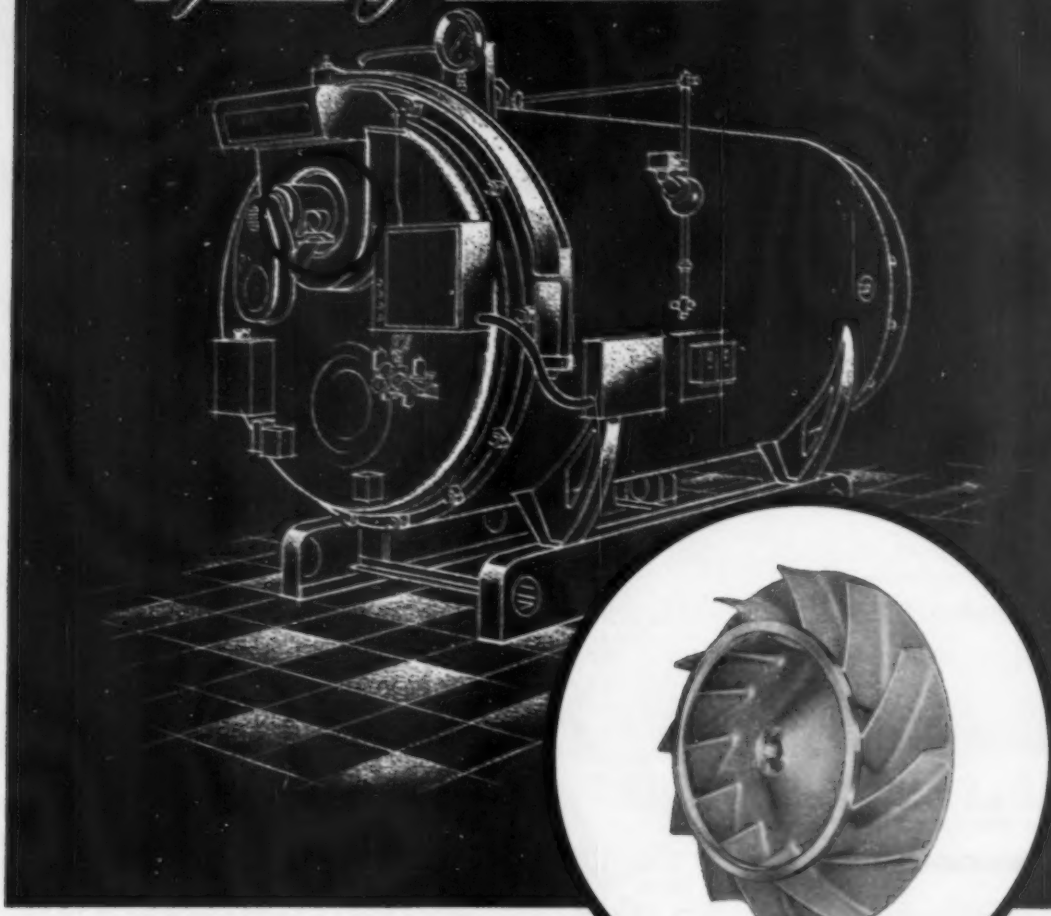
"Please send the one pound sample if the offer is still open. Thanks." *Lionel G. Gilbert, Test Chemist, Chemical Laboratory Southern California Edison Co., Alhambra, Calif.*

PLANT ENGINEERING:

"Please send us a one pound sample of sulfamic acid which you stated was available through the efforts of the Du Pont organization." *E. J. Trueblood, Chemist, Sewerage Div., City of Tucson, Ariz.*

■ The article the readers are referring to appeared in our issue of May, 1960;

Engineering Excellence stands out...



EXAMPLE:
Cleaver-Brooks exclusive *caseless fan*

This patented fan is the heart of a highly efficient forced draft system. Unique in design and function, this caseless impeller — made of sturdy cast aluminum, located deep within the front head of the boiler — provides combustion air at the required pressure and in the proper quantity to assure you of peak efficiency at any load level.

Efficiency extends into the area of maintenance, too. This fan never needs cleaning. Direct drive connection, without special bearings or V-belts, keeps the operation free from trouble... contributes to the quietest operation for any boiler you can buy today. Good reason why you should *insist* on Cleaver-Brooks.

Your Cleaver-Brooks agent has years of experience in boiler application. Contact him for more information on the features that exemplify the engineering excellence of Cleaver-Brooks.

Write for free booklet, "How to Select a Boiler."

Cleaver Brooks®

ORIGINATOR AND LARGEST PRODUCER
OF PACKAGED BOILERS
Dept. M, 364 E. Keefe Ave., Milwaukee 12, Wis.

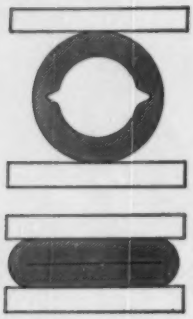
PERFORMANCE PROVES THE ENGINEERING EXCELLENCE OF CLEAVER-BROOKS BOILERS

31-61

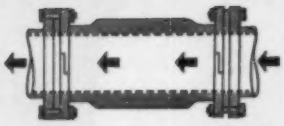
Circle 518 on postcard, page 33

Massco-Grigsby PINCH VALVES

"Hinged" sleeve permits tight closing reduces wear.



Recesses in sleeve serve as "hinges" during compression.



Unobstructed flow eliminates high friction loss; and there are no metal parts in contact with pulp or liquid.

Several types of closing mechanisms are available, from handwheel to motorized.

Automated Systems. Completely automatic systems may be coordinated and interlocked with other plant equipment.

1" to 14" I.D.; pressures to 150 psi; temperatures to 200° F.

WRITE FOR CATALOG 609

MINE AND SMELTER SUPPLY CO.

3800 RACE STREET • DENVER, COLORADO
OFFICES AND AGENTS IN PRINCIPAL CITIES
Circle 519 on postcard, page 33

BACKTALK—FORETHOUGHTS

the requests for their free sample of sulfamic acid have been forwarded to the manufacturer.—*Editors.*

Safe Lifting Quotient Needed

PLANT ENGINEERING:

"We should like to either obtain from you seven copies of the article 'Improve Your Safe Lifting Quotient and Avoid Accidents' which appeared in the February issue of PLANT ENGINEERING, or receive your permission to reproduce these from a copy which we have.

"These will be sent to our field engineers for their study and review." *Jim W. White, Construction Engineer, Engineering Department, Continental Oil Co., Ponca City, Oklahoma.*

■ Tear sheets of this article are still available and have been sent with the compliments of the Editorial department.—*Editors.*

Reprints Now Available

PLANT ENGINEERING:

"We have parts 2, 3, 4, 5, 6, 7, 10, 11 and 12 of Time Saver Series on Construction Cost Estimating. Will you please send us tear sheets of all remaining parts that you may have available." *R. E. Wiltrout, Plant Engineer, Diamond Crystal Salt Co., Akron, Ohio.*

■ Tear sheets of Construction Cost Estimating series are no longer available however, we do have reprints of the complete series for $1.50 per copy. Interested readers should send their request to the Editor, PLANT ENGINEERING—*Editors.*

No Charge for These Tear Sheets

PLANT ENGINEERING:

"We would appreciate your sending us five copies of your article 'Supply Systems for Instrument Air,' by Richard E. Frey, Systems Engineer, Fischer and Porter Company.

"We would be pleased to remit any charges involved for this material." *Thomas L. Renart, J. F. Kern and Co., Inc., New York 1, N. Y.*

■ These tear sheets are free for the asking and have been sent.—*Editors.*

Permission Granted

PLANT ENGINEERING:

"I read with considerable interest Mr. Poppe's article in your August issue regarding the use of hose for emergency pipe repairs. Since our company manufactures Teflon-lined hoses of the sizes and types mentioned in the article, I was naturally interested in the application potential suggested by Mr. Poppe's experience.

"This letter is to request twelve tear sheets of this story, if you can spare them. I would also like your permission to make a projection slide of the article for use in distributor sales meetings. This slide would show the name of PLANT ENGINEERING and would give full credit to the source." *Robert Swan, Sales Engineer, Resistoflex Corp., Anaheim, Calif.*

■ The article referred to is "Ready-Made Hose Lengths Speed Emergency Pipe Repairs" which appeared in our August issue. We have sent the requested tear sheets to Mr. Swan and gladly give our permission for him to make slides of the article.—*Editors.*

Helpful Filter Articles

PLANT ENGINEERING:

"If you have any literature on the two articles listed below, I would appreciate if you could submit a copy to me: 'Important Tips on Selecting Filter Media'—May, 1960; 'Techniques for Cleaning Filter Elements'—August, 1960." *Leon Hertzson, Engineer Missile Component Cleaning Laboratories, Div. Quaker Export Packaging Co., Inc., Philadelphia, Pa.*

■ Tear sheets on these filter articles are still available and have been sent the reader.—*Editors.*

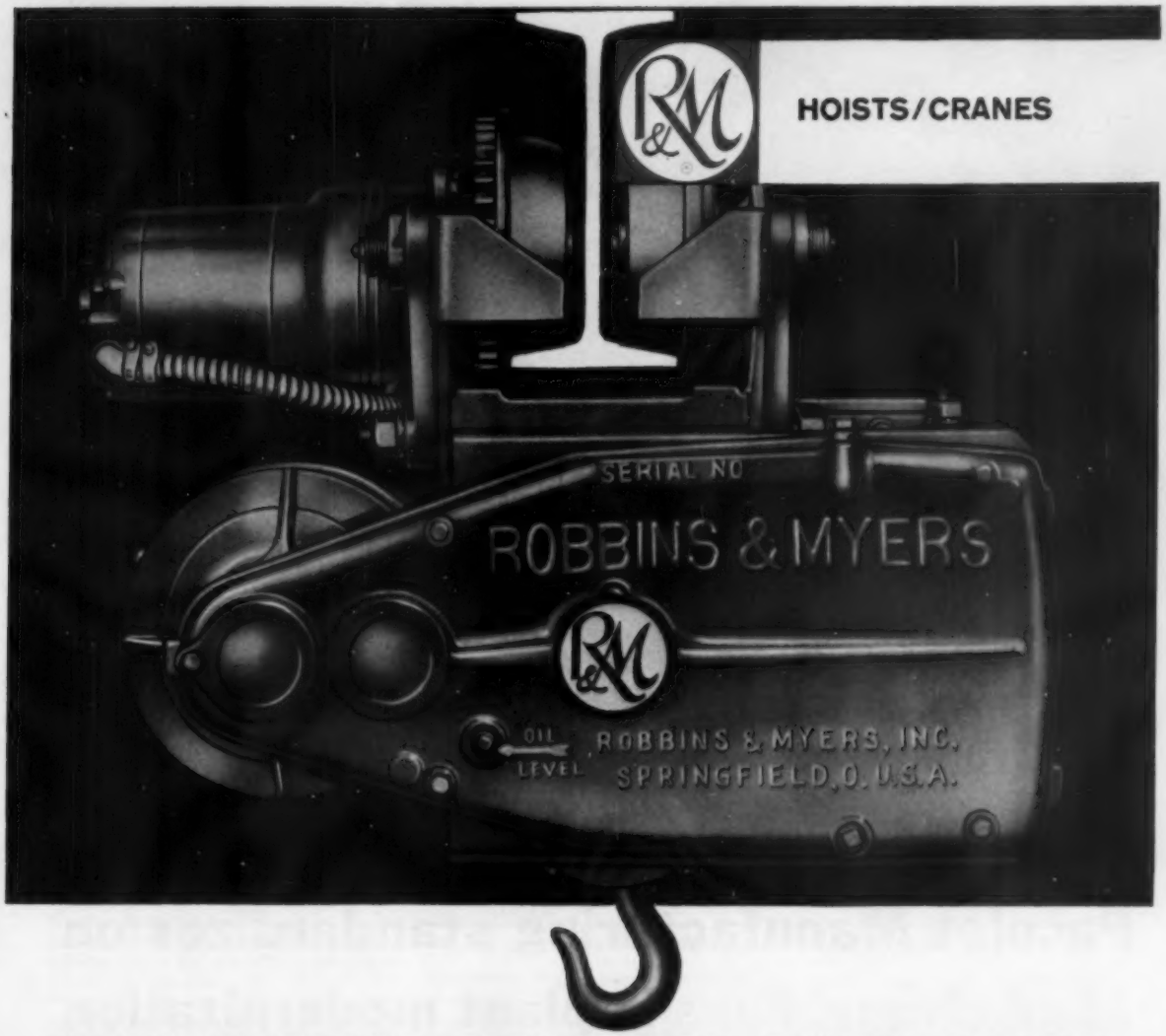
Weldor Reprint Available

PLANT ENGINEERING:

"I would like to obtain a reprint of the fold-out pages 109 to 112 entitled 'Training Maintenance Weldors, Part V—Qualification Testing Procedures,' from August issue PLANT ENGINEERING.

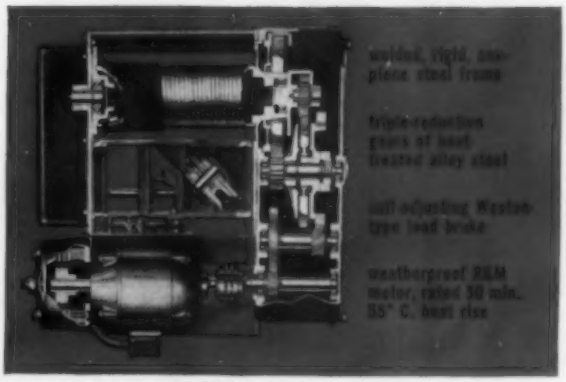
"Please let me know if this is available, as well as earlier parts of this feature." *R. M. Rood, Process and Equipment Development and Design, Manufacturing Engineering Subsection, General Electric Co., Pittsfield, Mass.*

■ The 22-page reprint of this complete five-part series is now available at $1.00 per copy. In addition to the helpful chart mentioned, the series includes Parts I through IV, covering types of joints, common weld faults, selecting electrodes and destructive testing of welds. Send your request to the Editor, PLANT ENGINEERING.—*Editors.*



BEAM-HUGGING R&M HOIST SAVES SPACE

R&M Type F Hoists hug the beams to save valuable overhead plant space! The drum is along one side of the beam; the motor-and-brake assembly parallel along the other side. This compact design—*yours at no extra cost*—gives inches more usable lift, without building higher runways. It permits closer end approaches, provides greater side clearances. Many safety features protect operator, hoist and load—weight-type upper limit switch, low-voltage control circuit, fully magnetic control, Weston-type automatic load brake, and others. Type F Hoists are available in four frame sizes, ½ to 10 ton capacity, powered by 1½ to 15 HP R&M motors. Mountings include lug suspension, push-type, hand-geared, and choice of three motor-driven trolleys. Write today for Bulletin 920-PE



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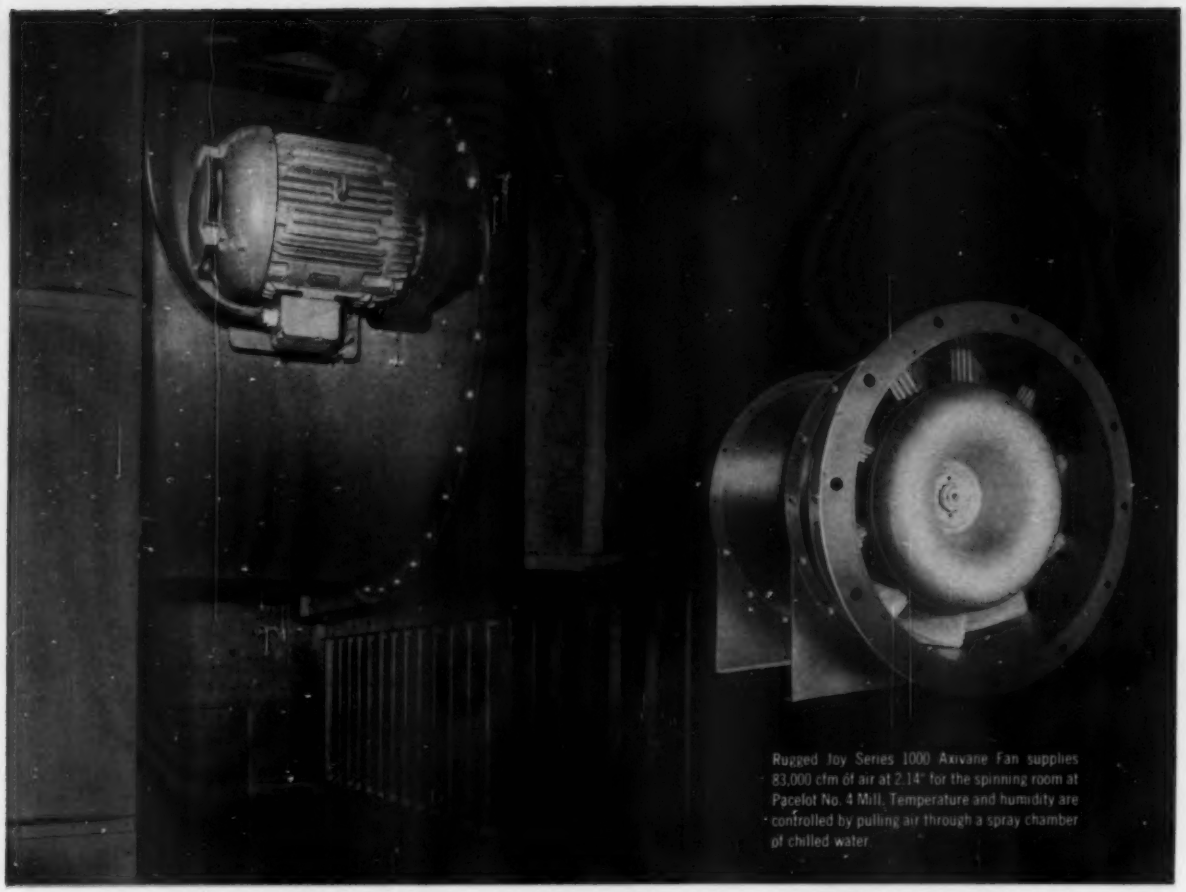
ROBBINS & MYERS, INC., Springfield, Ohio

Electric Hoists and Overhead Traveling Cranes • Fractional and Integral HP Electric Motors • Moyno® Industrial Pumps
Propellair® Industrial Fans • R & M-Hunter Fans and Electric Heat • Trade-Wind Range Hoods and Ventilators
Subsidiary companies at: Memphis, Tenn., Pico Rivera, Calif., Brantford, Ontario.

Circle 520 on postcard, page 33



Rugged Joy Series 1000 Axivane Fan supplies 83,000 cfm of air at 2.14" for the spinning room at Pacelot No. 4 Mill. Temperature and humidity are controlled by pulling air through a spray chamber of chilled water.

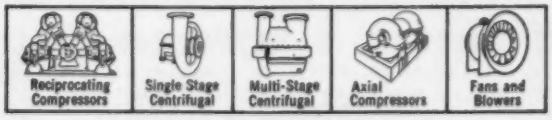
Pacolet Manufacturing standardizes on Joy Axivane® Fans in plant modernization

When several plants of Pacolet Manufacturing Co. modernized by installing complete air conditioning, Joy Series 1000 Axivane Fans were specified for all locations. The space-saving in-duct mounting, rugged construction and the ability to adjust blades to meet changes in load make the Joy fans ideal for the heavy duty air conditioning units being installed. Spinning, weaving and carding rooms require different humidities ranging from 45 to 85% for ideal operating conditions. Both temperature and humidity in each section of the plant are held to close limits, and it is extremely important that the fans be "on-the-line" all the time.

At Pacolet Mill No. 4, New Holland, Ga., 21 Axivane Fans of various sizes were installed, with diameters from 42 to 78 inches. Capacities range from 83,000 cfm to 26,400 and pressures from 2.14" to 2.89".

If you have a requirement for large volumes of air at relatively high pressures, the Joy Series 1000 Axivane Fans are the economical solution. They are engineered for heavy duty applications, and will give you maximum availability and low maintenance costs. Adjustable blades provide efficient volume control. For complete details on the Joy Series 1000 Fans, consult your Joy representative or write for Bulletin 2550-15.

AIR MOVING EQUIPMENT FOR ALL INDUSTRY



JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

Circle 521 on postcard, page 33

BULLETINS

JUST RELEASED and OF IMMEDIATE PLANT INTEREST

CONSTRUCTION AND MAINTENANCE

Metal Building Erection Manual
BSEM 3-61-L 1M, 8 pp, is a basic guide to proper erection of protected metal roofing and siding, using Steelbestos protected metal products. Separate sections cover unloading and storage, handling methods to assure minimum damage, repair methods and recommended installation tools. Bowman Steel Corp.

For a copy, circle 101 on Post Card

Prestressed, Precast Concrete
Advantages of Spancrete—a precast, prestressed concrete hollow core, machine-extruded flat slab—for roof, floor and wall systems are detailed in this 8-pp illustrated bulletin. Safe load tables included. Spancrete Machinery Corp.

For a copy, circle 102 on Post Card

Concrete Curing Methods
Importance and proper methods of curing concrete are outlined in Pamphlet RM-124. Covers effects of temperature on curing and describes curing techniques, including water spray, damp burlap, waterproof paper and membrane curing compounds. The Master Builders Co.

For a copy, circle 103 on Post Card

Fire-Protected Wood
Presented in 6-pp Bulletin W-365 are details on wood pressure-impregnated with inorganic chemicals to protect it against fire, as well as against attack by termites and by decay. Applications as a building material are cited. Koppers Co., Inc.

For a copy, circle 104 on Post Card

Slip-Resistant Steel Flooring
Raised lug steel plate for safety flooring material and steps, stairs, ramps, column covers, platforms, etc. is illustrated in this 8-pp bulletin. Weights, sizes, safe loads, fabricating and installation instructions included. Joseph T. Ryerson & Son, Inc.

For a copy, circle 105 on Post Card

Rolled Steel Floor Plate
Economical die-punched rolled steel floor for rugged industrial wear is featured in this product brochure. Installation details for laying in concrete. Wheeling Corrugating Co.

For a copy, circle 106 on Post Card

Industrial Epoxy Floors
Characteristics of epoxy floors designed to withstand industrial use are outlined in this product bulletin. Applications for acid, alkali, solvent resistant floors, and resurfacing jobs demanding speed are listed. Kalman Floor Co. Inc.

For a copy, circle 107 on Post Card

Fiber Glass, Aluminum Doors
Industrial doors featuring aluminum frames and fiber glass panels are illustrated and described in this product bulletin. Specifications are included. Frantz Mfg. Co.

For a copy, circle 108 on Post Card

Doors for Special Services
Catalog 1961, 12 pp, describes advantages and features of roof scuttles, smoke hatches, interior/exterior doors, ceiling access doors, and basement doors, stair and stringers. Actual photos and drawings show application, details and specifications; charts cover sizes, prices, weight. The Bilco Co.

For a copy, circle 109 on Post Card

Rugged Asbestos Board Insulation
Brochure IN-321A contains illustrations, technical data and typical applications of Steelbord insulation for sustaining heat to 800 F. Other insulations suggested for applications from 800 to 1800 F are also described. Johns-Manville.

For a copy, circle 110 on Post Card

Butyl Rubber Applications, Supplies
This 8-pp booklet on butyl rubber and its use in building applications gives properties and typical applications for roofing, roof coating, traffic decking, gasketing, weatherseals, and others. Enjay Chemical Co.

For a copy, circle 111 on Post Card

Industrial Maintenance Products
Presented in this 44-pp catalog are product and application data on polyester, epoxy resins and fibre glass materials. These include floor surfacing and patching materials for concrete, wood and composition floors; linings for tanks, stacks; plastic grouting mortar; concrete adhesive; epoxy paints and coatings, vinyl coatings. The Fibre Glass-Evercoat Co., Inc.

For a copy, circle 112 on Post Card

Floor Topping and Patching
Described in 7-pp Technical Bulletin 85 is a floor topping and patching compound for severe corrosive and abrasive conditions. Lists corrosive chemical actions which it resists and gives step-by-step procedure for applying. Sun Chemical Corp.

For a copy, circle 113 on Post Card

Industrial Maintenance Materials
Featured in this 20-pp product guide are maintenance materials for roofing, flooring, anchoring and grouting, electric motor cleaning, and ice control. Coverage data and drying time given. Ranco Industrial Products Corp.

For a copy, circle 114 on Post Card

Everything for Floor Care
Importance of proper floor care, and selection of equipment and supplies are covered in this 8-pp bulletin. Models are illustrated and specification charts included. Finnell System, Inc.

For a copy, circle 115 on Post Card

LUBRICATION

Lubricating Grease Guide
Basic principles and properties of lubricating grease are detailed in a concise, 32-pp summary, covering types of lubricating grease and applications. Effect of additives on properties of grease is covered and information on multi-purpose grease included. Bardahl Mfg. Corp.

For a copy, circle 116 on Post Card

Breaking Lubrication Barriers
Theory and use of solid lubricants are covered in Bulletin 132, 8 pp, discussing barriers to effective lubrication and properties of molybdenum disulfide as a dry-film lubricant. Actual applications show solutions to difficult lubrication problems; graphs, charts included. The Alpha-Molykote Corp.

For a copy, circle 117 on Post Card

Lubricating, Electrical Devices
Illustrated and described in 12-pp Condensed Catalog 61 are automatic oilers, mist systems, industrial fuses, and fuse accessories. Capacity and dimensional data. Trico Fuse Mfg. Co.

For a copy, circle 118 on Post Card

ELECTRICAL

Motors, Drives for Chemical Plants
Featured in Bulletin 113 are application photographs of gear-motors, adjustable speed drives, and explosion-proof, nonventilated drip-proof and wound rotor motors for use in chemical processing. Louis Allis Co.

For a copy, circle 119 on Post Card

Sealed Dry-Type Transformers
Eight-pp Bulletin GEA-6790A describes gas-filled dry-type transformers offering higher impulse levels, lighter weight. Includes tables of dielectric tests, standard ratings, dimensions. General Electric Co.

For a copy, circle 120 on Post Card

Postage-free cards for ordering Bulletins are on pages 33-34. You may also use the cards to order literature mentioned in the ads.

Motor Driven Power Systems
Electric power outlets whose movement can be synchronized with movement of a conveyor are featured in 8-pp Bulletin 83. Shows how such steps as continuity checks, alignment, cold test runs, watt tests, motor speed measurements, etc. can be performed "on the move." Feedrail Corp.

For a copy, circle 121 on Post Card

PVC-Coated Rigid Conduit
Detailed information on conduit and fittings permanently coated with polyvinyl chloride is presented in 8-pp Bulletin PB-101. Installation procedures, physical characteristics and

BULLETINS

(Begins on page 31)

mechanical data included. Pittsburgh Standard Conduit Co.

For a copy, circle 122 on Post Card

Semiconductor Power Rectifiers
This 56-pp revised "Guide to Metallic Power Rectifiers" features power supplies utilizing silicon and selenium semiconductors for a-c to d-c applications. These include anodizing, battery charging, current limiting, electrochemical processing, electron tube testing, relay testing, shop power supplies, and semiconductor power conversion systems. The Meaker Co.

For a copy, circle 123 on Post Card

Selection of Recorders
Specifications for selecting direct-and servo-operated, switchboard and portable recorders are presented in 12-pp Bulletin GEA-6933A. Lists over 40 electrical and physical parameters that can be measured by recorders. General Electric Co.

For a copy, circle 124 on Post Card

Industrial Truck Batteries
Construction features of industrial truck batteries with shock-resistant containers and covers are described in Bulletin IT-530. Specifications included. C & D Batteries, Div. The Electric Autolite Co.

For a copy, circle 125 on Post Card

Motor Winding Protection
Solid-cast method of encapsulation for protection of motor windings against severe environmental conditions is described in 8-pp Form F-2034. Includes specifications and results of extensive tests on the formulation and on complete solid-cast stators. U. S. Electrical Motors Inc.

For a copy, circle 126 on Post Card

Versatile Electrical Resin
Brochure CDC-397, 8 pp, describes advantages of Lexan polycarbonate resin for electrical and electronic components. Technical data on electrical and physical properties are included and typical applications described. General Electric Co.

For a copy, circle 127 on Post Card

Electrical Tape Specifications
Selection information on plastic tapes, friction tapes, splicing compounds and special purpose tapes is included in this 8-pp bulletin. Physical and electrical properties listed. Plymouth Rubber Co., Inc.

For a copy, circle 128 on Post Card

Electronic Products for Industry
Catalog 210A, 584 pp, describes electronic parts and products, listing capacitors, relays, plugs, transformers, public address and communication systems and hundreds of other products. A special 13-pp directory of semiconductors, designed to facilitate ordering, presents transistors, diodes, etc. A technical book section lists titles on electronics and related subjects. Allied Electronics Corp.

For a copy, circle 129 on Post Card

LIGHTING

Area Lighting Guide
Included in 30-pp Bulletin GEA-7223 are an equipment selector, sample lighting layouts, description of typical area lighting applications, parking lots, walkways, building facades, etc. Also includes details on structural features and electrical characteristics of incandescent, mercury and fluorescent fixtures, as well as specifications. General Electric Co.

For a copy, circle 130 on Post Card

Area Lighting Reference
Bulletin GET-3100, 16 pp, describes basic functions of luminaires, with photometric data and sample problems for lighting applications. Includes a discussion of economic considerations for design selection, with technical standards by which to measure choices. General Electric Co.

For a copy, circle 131 on Post Card

Fluorescent Lamp Ballast Guide
Listed in this 16-pp Buyer's Guide are fluorescent lamp ballasts for every lighting application. Complete electrical data, dimensions and shipping data included, as well as wiring diagrams. Advance Transformer Co.

For a copy, circle 132 on Post Card

HEATING, VENTILATING

Weatherproof Central Heaters
Advance Engineering Data OG, 8 pp, describes major features of heating, ventilating and cooling equipment for roof or grade-level installation. Charts cover heating-cooling selection, blower data, and dimensions. Lennox Industries, Inc.

For a copy, circle 133 on Post Card

Direct-Fired Gas Heaters
Industrial applications of direct fired gas heaters are discussed in 8-pp Heating Handbook GN-200. Explains how to use heaters for general space heating and special applications; includes typical heat load calculation data. Reznor Mfg. Co.

For a copy, circle 134 on Post Card

Gas-Fired Unit Heaters
Operating and construction features of centrifugal blower type gas-fired unit heaters for installations where low noise level is important are detailed in Bulletin A-917. Tables of dimensions and performance data. American-Standard Industrial Div.

For a copy, circle 135 on Post Card

Water Heating Equipment
Featured in 16-pp Form 1551B are expansion tank, steam and water converters with typical installation diagram. Includes specifications, pressure-drop tables, performance curves and general information on circulators, valves, fittings, specialties and converters. Dunham-Bush, Inc.

For a copy, circle 136 on Post Card

Heating, Ventilating Equipment
This 40-pp 1961-62 Estimating Catalog is a comprehensive price and selection guide to air conditioning, ventilation, refrigeration and heating supplies and equipment. Quick selection tables cover blower units, fans, coils, cooling towers, evaporative condensers, valves etc. Blazer Corp.

For a copy, circle 137 on Post Card

Power-Flow Roof Ventilator
Design and construction features of motor-driven fan units which operate independently of weather conditions are illustrated in 16-pp Bulletin DR-38. Includes capacity tables, detailed selection and calculation data, and chart for determining volume. DeBothezat Fans Div., American Machine and Metals, Inc.

For a copy, circle 138 on Post Card

Vertical Discharge Roof Ventilator
Characteristics and performance of these motor-driven weather-proof vertical discharge fans are detailed in 16-pp Bulletin DB-39-59. Capacity tables, selection details, volume chart included. DeBothezat Fans Div., American Machine and Metals, Inc.

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Fan, Coil Filter Units
Features and design of evaporator-blower-filter units are described in Engineering Data LSB, 14 pp, with typical applications illustrated. Specifications, dimensions and stacking arrangements are included, plus step-by-step examples of use of performance charts. Lennox Industries, Inc.

For a copy, circle 140 on Post Card

WASTE TREATMENT

Industrial Waste Treatment
Problems of waste treatment, classification of wastes and methods of solving these problems are covered in 16-pp Engineering Data Ref. 3-SIC-3900.21-1. Equipment and processes are detailed. B-I-F Industries.

For a copy, circle 141 on Post Card

Compact Sewage Treatment Plants
Twelve-pp Bulletin 7330 covers design and operating features, installation practices, and other aspects of these compact sewage treatment plants for use where municipal sewage treatment is unavailable or where pipe and pumpage costs make tying-in to existing sewer system too expensive. Dorr-Oliver Inc.

For a copy, circle 142 on Post Card

VALVES, TRAPS, FITTINGS

Condensed Valve Supplement
Included in this 16-pp supplement are catalog sheets on two-, three- and four-way solenoid valves developed since issuance of company's last general catalog. Gives maximum pressure ratings, operation details, dimensions. Automatic Switch Co.

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Leakproof Ball Valves
Detailed information on manually operated and pneumatically operated ball valves is presented in 32-pp Catalog 1200-A. Pneumatic operators for automatic and remote on-off operation are illustrated, also special valves, and complete dimensions, weights given. Hills-McCanna Co.

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(More Bulletins on page 223)

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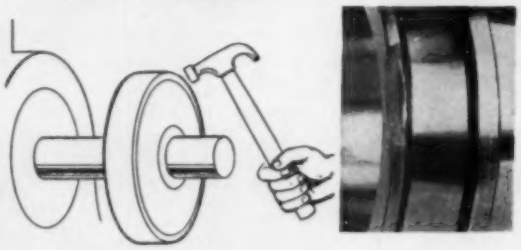
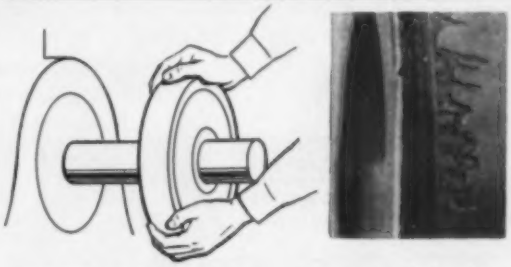
DISTRIBUTOR DAN, the SKF bearing man, lists

THE 5 MAIN REASONS WHY BEARINGS FAIL

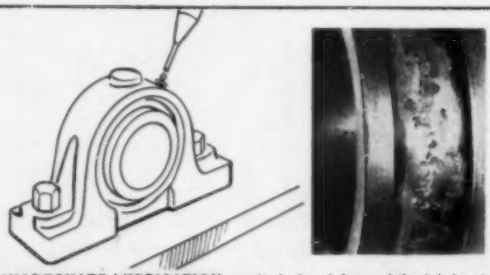
and some helpful tips to eliminate them



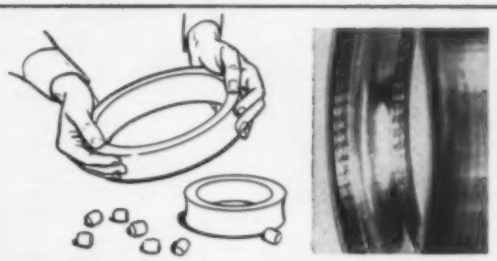
ABUSE DURING MOUNTING. Don't hammer the outer ring of a bearing having an interference fit on the inner ring. Striking the outer ring with a hammer almost always causes denting, brinelling, and even breakage—as shown in the photo at right.



IMPROPER MOUNTING can cause edge-loading and fatigue-flaking, especially in tapered and cylindrical roller bearings. Watch out for off-square mounting or cocking of the inner or outer ring, out-of-line housings or shaft deflection—all of which mean misalignment.



INADEQUATE LUBRICATION results in breakdown of the lubricant by carbonization into a fine abrasive. Heat generated softens the bearing steel and early failure results. So, be sure to give your bearings the right amount of lubricant in the right place at the right time.



DIRT AND OTHER PARTICLES will often cause denting, as shown at right. Even soft particles—brass, aluminum, wood and paper—can dent a rolling surface. Protect your bearings by using effective seals and maintaining cleanliness at all times.

CORROSION CAN START if you wash the bearing in cold solvent and then cover it with a cold slushing compound. The moisture can't evaporate so it expends itself in corroding the steel. To prevent this, immerse the bearing in hot oil or slushing compound and allow it to assume the temperature of the bath.

Baffled by a bearing problem? Whether it's selection, mounting, or maintenance—consult your Authorized SKF Distributor. He's staffed to help you keep them running smoothly and he stocks all the bearing types and sizes you need.

SKF

AUTHORIZED DISTRIBUTOR

4034

SKF MOTION ENGINEERING

Advanced ball and roller bearing technology

Circle 522 on postcard, page 33

Quality metal products deserve "the finishing touch" of Mahon

another example: Tappan's new dishwasher and famous '400 RANGE SERIES' of appliances now finished in unique COMBINATION system

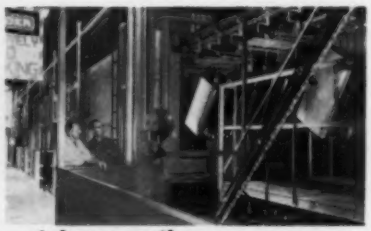
For any product finishing, *"Mahon designs equipment but engineers results"*. The recently installed Mahon finishing system for Tappan fully attests to the statement. Here's equipment designed to improve quality, provide painting versatility, expand capacity, reduce material inventories and slash finishing costs. Mahon, working with Tappan plant engineers, supplied the answer—an integrated finishing system to do washing, phosphatizing, dip painting, spray painting, plasticol coating and oven baking of about 300 different parts. Floor space? It *saves* 4000 sq. ft. of production area as it has now been relocated on the plant roof. Results? A versatile, efficient system that met all requirements *and* is now saving Tappan $60,000 a year. Can you afford not to call in Mahon on your metal cleaning and industrial finishing problems?

The Tappen Co. of Mansfield, Ohio, a quality leader in the home-range field has now expanded into the dishwasher market with advanced-design, big-capacity models... finished by Mahon.

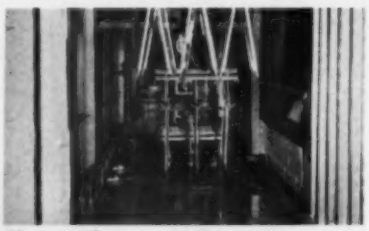
MAHON INDUSTRIAL EQUIPMENT
• Complete Finishing Systems • Metal Cleaning Equipment • Pickling Equipment • Painting Facilities—spray, dip and flo-coaters • Drying and Processing Ovens • Special Process Equipment

MAHON PLANT SERVICES
Steel Fabrication—weldments, machining and assembly • Structural Steel—fabrication and erection • Rolling Steel Doors—standard, Labeled and power-operated

WRITE FOR MAHON CATALOG A661.
ALSO IN SWEETS P. E. FILE.

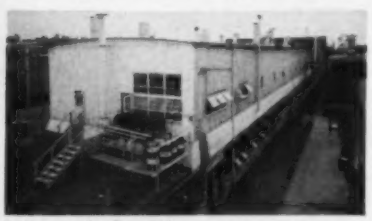


metal preparation, cleaning and phosphatizing is done in a seven-stage Mahon automatic-cycle unit.



dip coating or spray painting in same unit—dip tank is on tracks and automatically positioned.

plasticol coating is by high-pressure spray in Mahon water-wash booths with reclamation pans.



integrated system is self-housed on plant roof—made change-over easy, saved space.

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN
MANUFACTURING PLANTS—Detroit, Michigan and Torrance, California
SALES-ENGINEERING OFFICES—Detroit, New York, Chicago, Cleveland, E. Orange, N. J., Seattle, Wash., San Francisco and Torrance, Calif.
REPRESENTATIVES in all principal cities.

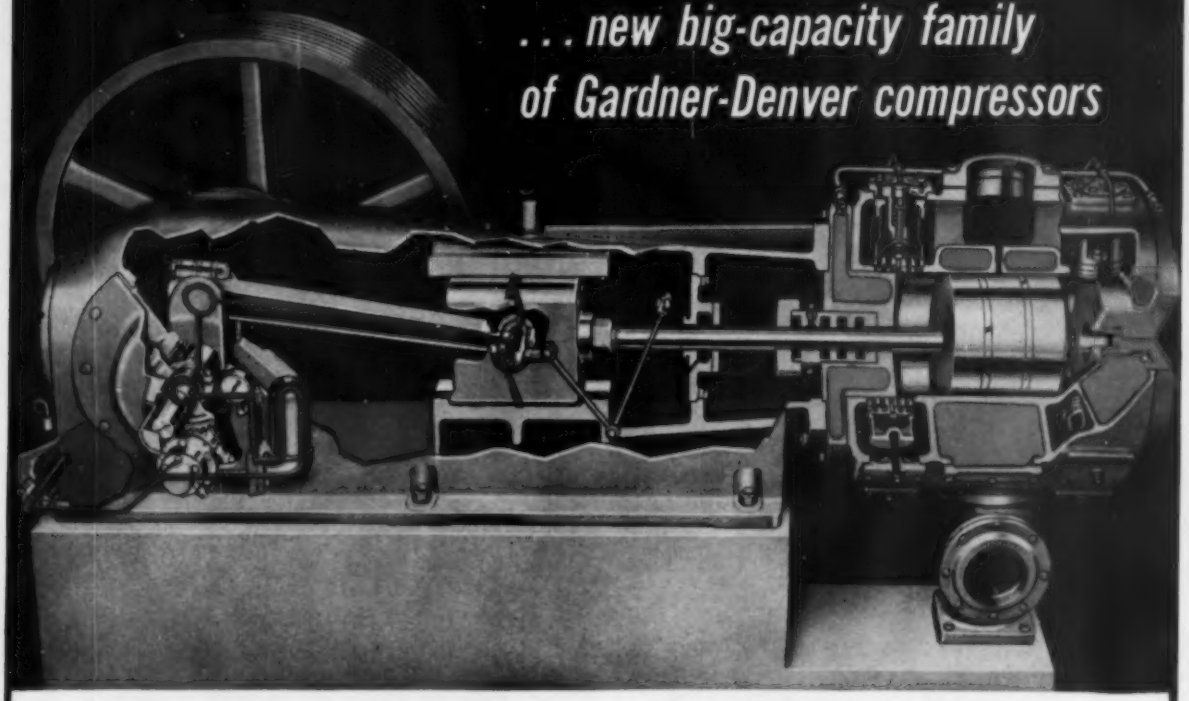
YOUR BIGGEST VALUE IS IN MAHON'S PLANNING AND ENGINEERING EXPERIENCE

MAHON

Circle 523 on postcard, page 33

MORE AIR POWER PER SQUARE FOOT OF FLOOR SPACE

. . . new big-capacity family of Gardner-Denver compressors

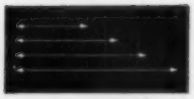


Pressure lubrication

New pressure system thoroughly lubricates bearings and moving parts in power end. System includes extra capacity oil sump, strainer, oil pump, oil filter and oil passages to all bearings.

Greater cooling capacity

Large water passages through the cylinder head and jacket efficiently cool the greater volume of compressed air delivered by Gardner-Denver RL compressors.



Four basic sizes with 5", 7", 9" and 11" stroke power frames, fill a wide range of capacity and pressure requirements... from 20 to 150 hp. All compressor sizes are available with oil-free construction.

Single stage RL horizontal models displace 108 to 1592 cfm, with pressures ranging from 20 to 150 psi.

RLT two-stage tandem compressors provide higher pressures up to 500 psi, with displacements ranging from 94 to 504 cfm.

RLV vacuum pumps give from 267 to 1383 cfm displacement; provide vacuum service to 29.8 in. Hg.

***New bulletins** describe in detail this fine new family of big-capacity Gardner-Denver RL compressors. Write for your copies now.*

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER-DENVER

Gardner-Denver Company, Quincy, Ill.—Offices in principal U.S., Canadian and Mexican cities
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario
International: Gardner-Denver International Division, 233 Broadway, New York 7, N.Y.
Offices: Buenos Aires, Argentina; Artarmon, N.S.W., Australia; Brussels, Belgium; Rio de Janeiro, Brazil; Santiago, Chile; Barranquilla, Colombia; Lima, Peru; Ndola, N. Rhodesia; Salisbury, S. Rhodesia; Johannesburg, Transvaal.

Circle 524 on postcard, page 33

This is Careytemp®

Composition — A new pipe and block insulation material . . . millions of glassed-in air cells of expanded silica bound together, reinforced with inorganic fibres. Gives exceptional strength, yet is lighter than other industrial insulations. Density: 9 lbs. per cu. ft.

High Moisture Resistance — Absorbs practically no moisture. Minimum efficiency loss under wet or humid conditions.

Low Shrinkage — Practically no linear shrinkage, even at high temperatures (0.7% at 1200° F.). Minimum heat loss at joints.

Low Thermal Conductivity — Only .33 B.T.U./sq. ft./hr./°F. at 100° F. — .77 at 1000° F. mean.

High Acid & Corrosion Resistance — Improved performance on acid-processing and stressed stainless steel equipment. Not damaged by most acids. Chemically-inert composition ideal where corrosion is a problem.

Wide Size Range — Available in larger labor-saving sizes. Blocks in new 24" widths and pipe insulation in half sections through 24" pipe size.

Over four years of field use have proved Careytemp, following thorough laboratory testing at Mellon Institute of Industrial Research. For Careytemp samples and additional specifications, write Dept. PE1161, Insulation Division, The Philip Carey Mfg. Company, Cincinnati 15, Ohio.

Arkansas Power and Light Company, Helena, Arkansas. Over 50 carloads of Careytemp pipe and block insulation applied by B & B Engineering and Supply, Houston, Texas. Plant designed by Ebasco Services. Has Babcock and Wilcox boiler, Westinghouse Turbine.

Circle 525 on postcard, page 33

PLANT ENGINEERS' DIGEST—so those who rush may read and know what's new

Edited by Bea Berghorn

Material Handling Crane Converts to Firefighter—Quickly and Easily

CONVERSION of a seven-ton mobile hydraulic crane into an effective piece of emergency firefighting equipment can be just a matter of minutes.

By fitting a permanent steel mounting plate on the telescoping boom of an Austin-Western crane, the Chalk River Project of Atomic Energy of Canada, Chalk River, Ontario can attach a deluge set to the ⅜-in. steel mounting plate by the simple tightening of two wing nuts. The height and angle of the nozzles are instantly adjustable.

Water is supplied by a pumper or direct from hydrants, and two, three or four 2½-in. hoses can be fed from the deluge set.

The mounting plates are inexpensive and in no way interfere with normal operation of the crane in its everyday duties. *From a release of Austin-Western Div., Baldwin-Lima-Hamilton Corp., Philadelphia, Pa.*

Anchor plate is permanently clamped to boom, does not interfere with operations of material handling crane.

Telescoping boom of crane can be positioned at desired height, to direct stream of water wherever most needed.

Tester Measures Thickness

DESIGNED to accurately measure the thickness of any portion of a standard size laminated sheet, a tester has been put into operation by Synthane Corp., Oaks, Pa.

Tester can be easily read as all parts of sheet are brought between anvils.

This new instrument, designed and built by Frank Everson, Synthane Chief Engineer, is primarily a scanner, consisting of a table and a "C" arm fitted with ball anvils for rolling contact.

Set for thickness to be measured by means of gage blocks, the deviation in thousandths over or under the specified thickness, can be read rapidly as all parts of the laminated sheet are brought between the anvils of the scanner.

Previously, thickness testing was limited to the outer edges of the sheet by micrometer measurement and over-all thickness could not be accurately determined.

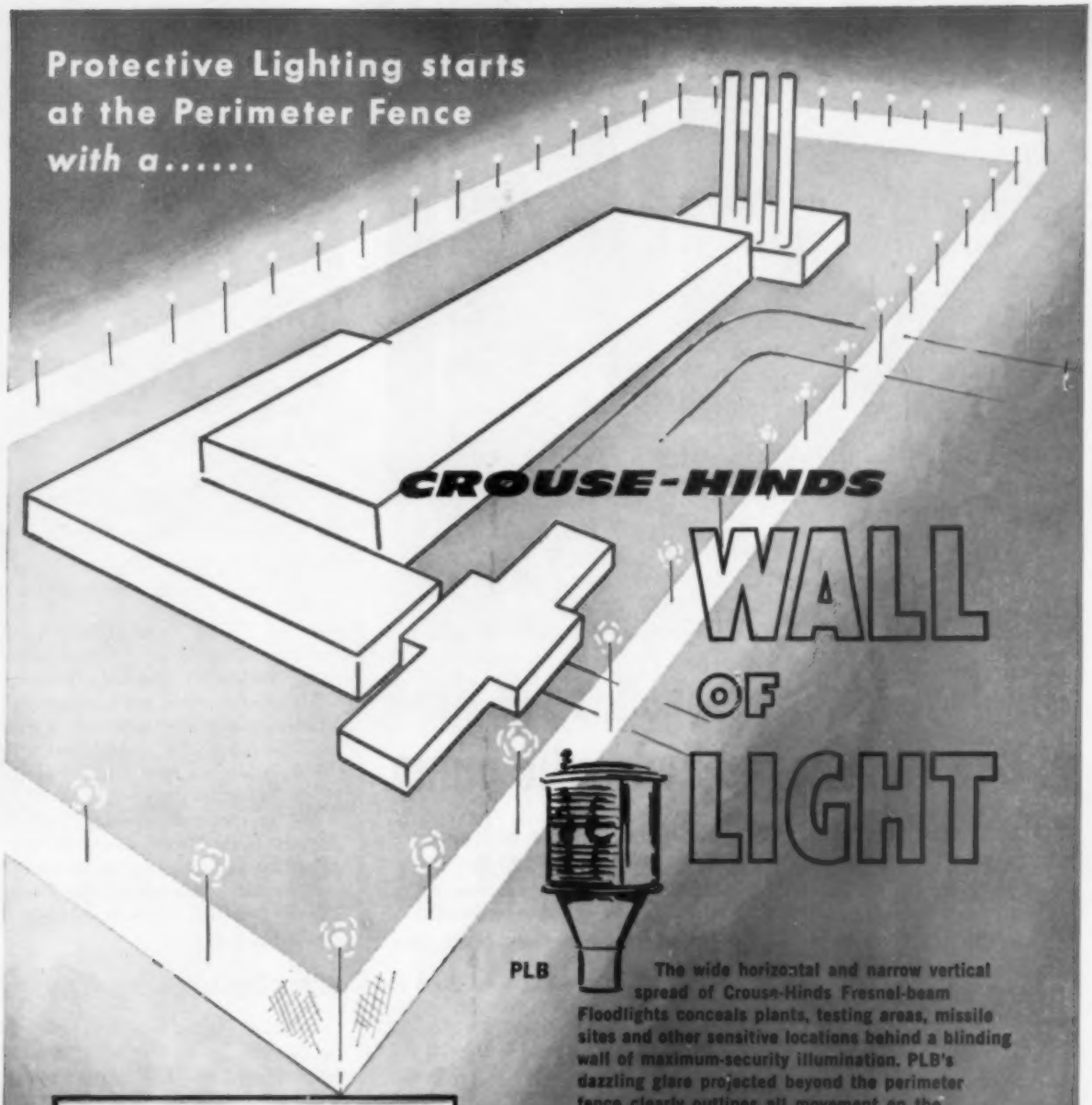
The tester is used primarily on copper-clad sheets for printed circuits where total thickness of laminate plus foil may be critical. *From Synthane News, published by Synthane Corp., Oaks, Pa.*

Hinged Closures Speed Replacements

REPLACEMENT of blind flanges with Tube Turn hinged closures saved approximately 90 per cent of the time ordinarily required to open and close dry gas cleaners during inspections.

Cleaners, installed at the inlet of regulating and metering stations, remove any dirt or dust particles that may be present in the gas. Hinged closures, with yokes that hold tight under pressure but open readily with hand-wrench loosening of single swingbolts when pressure is not present, are used to cap two vertical

Protective Lighting starts at the Perimeter Fence *with a.....*



CROUSE-HINDS

WALL OF LIGHT

PLB The wide horizontal and narrow vertical spread of Crouse-Hinds Fresnel-beam Floodlights conceals plants, testing areas, missile sites and other sensitive locations behind a blinding wall of maximum-security illumination. PLB's dazzling glare projected beyond the perimeter fence clearly outlines all movement on the approaches, yet obscures guard, patrol and other activity on plant property.

Modified beams conform to land contours. No shadows. No blind spots. Multiple and series types afford economical current distribution for varying line lengths. A range of sizes, wattages and foot-candles satisfy all plant-geometry and topographical requirements.

ADE
incandescent

MVE
mercury-vapor

ADE and MVE Productive-Area Floodlights turn Nighttime into Day

Whether you need incandescent ADE or mercury-vapor MVE lights for your plant or building areas depends on hours of burning, relamping difficulties and labor costs. Whatever your requirements, wide or narrow beam, short or long range, Crouse-Hinds has a highly-efficient, heavy-duty projector especially for the job.

*For detailed information call your Crouse-Hinds distributor or ask for Floodlight Catalog No. 2714.

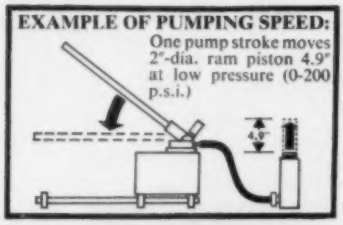
CROUSE HINDS

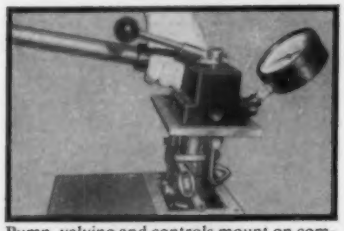
REG. U.S. PAT. OFF.

MAIN OFFICE: SYRACUSE, N.Y. FIELD OFFICES: Albany, Atlanta, Baton Rouge, Birmingham, Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Corpus Christi, Dallas, Denver, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Oregon, St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Tampa, Tulsa, Washington. RESIDENT REPRESENTATIVES: Baltimore, Md., Meriden, Conn., Reading, Pa., Richmond, Va., Springfield, Mass.
Crouse-Hinds of Canada, Ltd., Scarborough, Ont. Crouse-Hinds-Demex, S.A. de C.V. Mexico City, D.F. Peterco, Sao Paulo, Brazil

Circle 526 on postcard, page 33

Get fast ram approach, save time with new 2-speed hydraulic pump





Pump, valving and controls mount on common cover plate; use with other reservoirs.

- **Delivers a big 7.35 cu. in. of oil per stroke at low pressure (0 to 200 p.s.i.)**
- **Delivers .294 cu. in./stroke from 200 to 10,000 p.s.i. for high force requirements**
- **For operating both single and double-acting cylinders**

Here is a compact, precision-built 10,000 p.s.i. 2-speed hand pump with the ability to deliver exceptionally high volume at low pressure for fast ram approach and return. Handle high-force requirements, yet waste no time getting the ram to the work! Choice of 2-way or 4-way control valve, mounted easily on cover plate; no exposed piping. Unit weighs only 34 lbs.

Ask your OTC distributor about the new OTC "Dualmaster" pump.

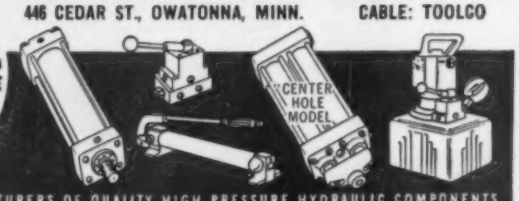
PRECISION HYDRAULICS DIVISION

OWATONNA TOOL CO.

446 CEDAR ST., OWATONNA, MINN. CABLE: TOOLCO

RESEARCH · ENGINEERING · DEVELOPMENT

OTC



DESIGNERS AND MANUFACTURERS OF QUALITY HIGH PRESSURE HYDRAULIC COMPONENTS

Circle 527 on postcard, page 33

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

Quick-opening hinged closures are time-savers in replacement of filters.

members. These vertical members contain removable cages of filter pads and a horizontal cleanout member.

These enclosures are used at an asphalt plant of Northern Industries, Inc., Gibsonia, Pa., where natural gas is used to heat asphalt mix before delivery to job sites.

Use of the quick-opening hinged closures has reduced downtime for inspection as well as for replacement of filter pads. *From a release of Tube Turns Div. of Chemetron Corp., Louisville, Ky.*

Mixture Controlled Automatically

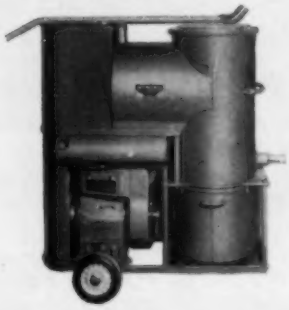
SEVERAL ADVANTAGES were gained by changing to pneumatic, automatic proportioning flow control of treating solution for boiler feed water at Fairless Works, U. S. Steel Corp.

Formerly whenever the water analyst found water conditions that showed need of a change in proportioning of the treating solution, a maintenance man had to mechanically adjust plunger stroke length. With the automatic system they are realizing increased effectiveness, as well as efficiency of water treatment and the elimination of mechanical adjustments of pump stroke length.

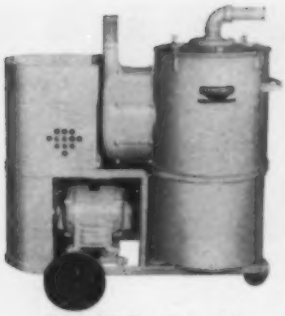
Consisting of a proportioning metering pump, the coagulent proportioning system is controlled by a flow transmitter. The transmitter measures the flow of untreated water into a flash mixer.

The coagulant solution is then

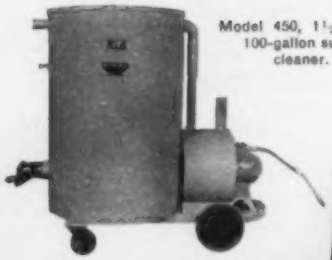
Model 415-A with wet separator, for explosive powders.



Model 700 with 10 H.P. gas engine.

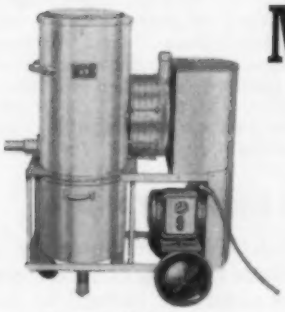


Model 809-B with special separator tank for textile use.



Model 450, 1½ H.P., 100-gallon sump cleaner.

Model 630, ½ H.P. AC motor, for stationary mounting.



Standard Model 300, 3 H.P.

MORE MODELS ...MORE VACUUM EXPERIENCE

Pictured above are only a few of the Invincible models available. There are 28 standards, plus specially built units, combinations and a range of accessories and tools — the most extensive vacuum line available.

Invincible Vacuum Units are designed specifically for industrial use. They have the strength and stamina to take gruelling job conditions in stride.

And they are backed by more than 50 years of experience in vacuum application — experience you can draw upon to best solve production, processing, conveying and cleaning problems.

Consult our resident engineers in all principal cities . . . accurate free surveys can be made on short notice. And send for "Invincible Vacuum Equipment" folder which describes how Invincibles save on a range of production and maintenance operations.

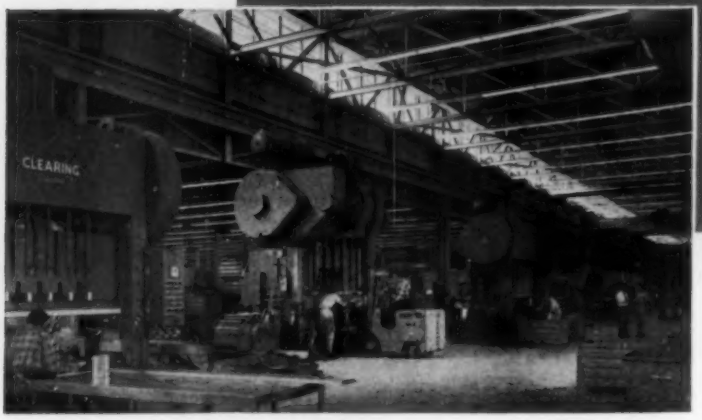
INVINCIBLE

vacuum cleaner manufacturing co., Dover, Ohio

Circle 528 on postcard, page 33

13,500 sq. ft. of ⅛" Luxlite Coolite Heat Absorbing Glass, Glare Reduced one side, has been installed in plant of Cutler Hammer, Inc., Lincoln, Ill., pioneer electrical manufacturer. Design and construction by The Austin Company.

MISSISSIPPI GLASS
tailors light
TO SUIT YOUR NEEDS



The property of light diffusion in translucent glass by Mississippi is one of the most useful tools available to engineers and architects. Rooms can be adequately daylighted far from windows; small skylights can cover large expanses of floor space with shadowless daylight; privacy can be secured . . . light controlled. Working hand-in-glove with modern daylighting practice, Mississippi glass reduces contrast that results in costly visual errors . . . keeps interiors more comfortable.

Write today for new catalog.

Address Dept. 13.

With Coolite, Heat Absorbing glass, occupants see better . . . feel better . . . work better. Coolite and a wide variety of other patterns, wired and unwired, are available at your quality glass distributor. See him today.

MISSISSIPPI
GLASS COMPANY
88 Angelica St. • St. Louis 7, Missouri
NEW YORK • CHICAGO • FULLERTON, CALIFORNIA

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

Circle 529 on postcard, page 33

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

pumped into the flash mixer from a storage tank in the controlled proportion of two to five parts per million of feed water. *From a release of Associated Control Equipment, Coraopolis, Pa.*

Scooter Goes to the Rescue

Equipped with fire hose, fire axe and four different types of fire extinguishers, this scooter can be moved to any area in the plant or on the grounds in a matter of minutes. Converted from an industrial motor scooter by Howard Kenworthy and Ora Black of Johns-Manville Industrial Insulations Plant at Richmond, Indiana, this vehicle can be parked in any convenient location and makes an effective firefighting unit. (From News Pictorial published by Johns-Manville Corp., New York, N. Y.)

Tote Boxes—Carry or Store

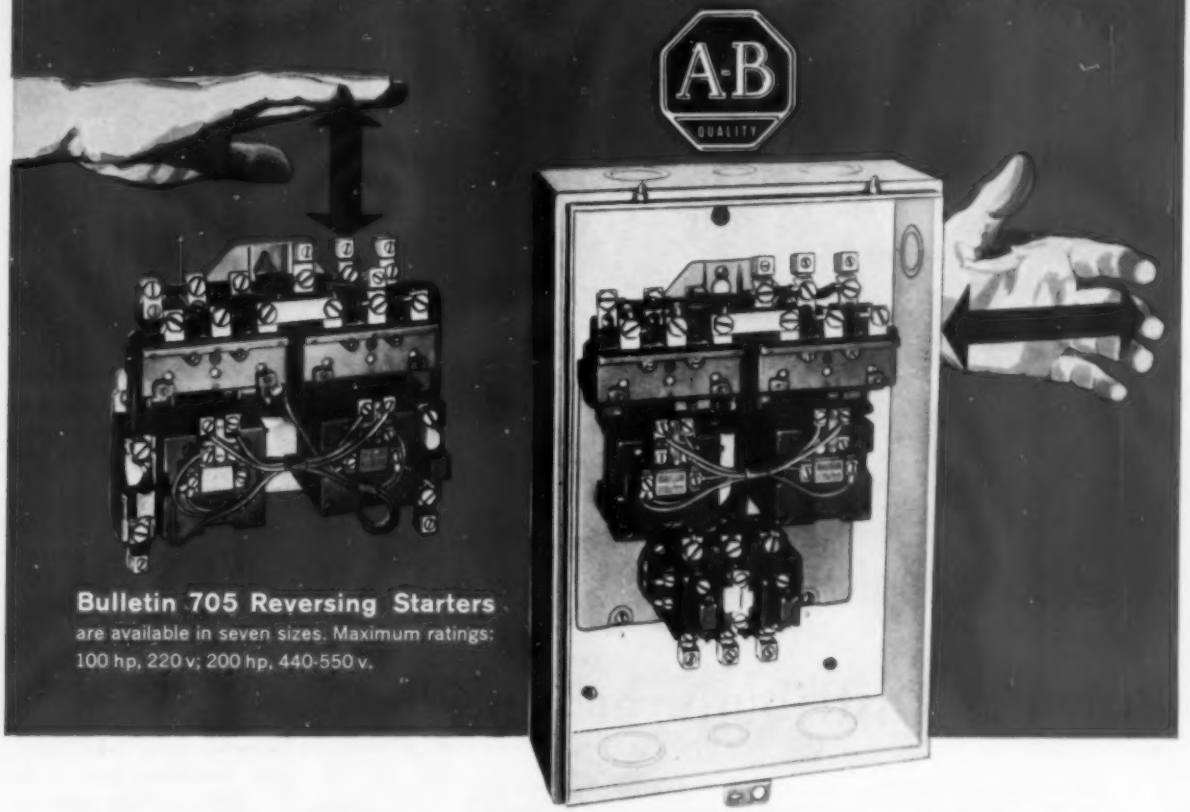
CUSTOM-MADE tote boxes are used to encase a variety of aircraft engine parts as they are moved from finishing and inspection stations to finished stores and spare parts packing departments.

The boxes, made of polyethylene and coated with a preservation compound, are used to hold such parts as crankcase front housing, crankcase assemblies, rear housing, rear covers and diffuser plates, some parts weighing as much as 75 pounds.

In use at the Wright Aeronautical Div. of Curtiss-Wright Corp., Wood-Ridge, N. J., none of the 200 boxes in the original order shows any sign of wear after repeated use and washing during their 18 months of service.

Manufactured by Patti-Plastics Corp., Newark, N. J., the tote boxes

No Matter Where You Install Them—



Bulletin 705 Reversing Starters are available in seven sizes. Maximum ratings: 100 hp, 220 v; 200 hp, 440-550 v.

The New Allen-Bradley Reversing Starters are "Ideal" for the Application

Whether you're using the "open type" Bulletin 705 reversing starters in special panel mounting or as an enclosed device for mounting on a machine, the space you can save will surprise you—especially in the higher ratings! For instance, the open type construction is appreciably narrower than the older design. In the enclosed design—because the overload relays (either 2 or 3) are mounted as a "block" below the reversing switch, the cabinet is much narrower.

There is no denying that the new A-B Bulletin 705 reversing starter is the best "buy" on the market today. Rating for rating, the old reliable Bulletin 705 reversing switches can no longer be compared with their successors. While the simple one-moving-part solenoid principle of operation has been retained, the detail design and construction has been greatly improved. The result is *extra* life that assures almost unbelievable reliability.

The new, attractive enclosures add extra "eye appeal" to any installation. For full details, please write today for Publication 6100: Allen-Bradley Co., 1317 South First Street, Milwaukee 4, Wisconsin.

ALLEN-BRADLEY

Member of NEMA

QUALITY MOTOR CONTROL

Circle 530 on postcard, page 33

Polymer Distributor at Work!

Bob Osborne, of Bearings, Inc. (a Polymer Distributor) points to POLYPENCO® nylon channel extrusion he recommended for a Zanesville, Ohio bus company. The nylon sash guide seals effectively, provides smooth, quiet sliding action, and saves hundreds of dollars yearly in replacement costs.

This is the kind of time and money-saving professional help you get when you call an Authorized Polymer Distributor. He's qualified by experience and ability to give you the benefit of Polymer's extensive plastics design and engineering know-how. With it, of course, you get the finest quality plastics from the most complete stocks available.

Polymer's broad, coast-to-coast distributor network has been carefully built to these strict qualifications. Next time you need help in industrial plastics, get your "premium" of expert Polymer design and engineering help...from your local distributor. He's as near as your telephone.

Look up POLYPENCO industrial plastics under "PLASTICS . . . SUPPLY CENTERS" in the yellow pages—and write Polymer for Bulletin BR-1.

POLYPENCO®

THE POLYMER CORPORATION OF PENNA.

Reading, Pa. / Export: Polypenco, Inc., Reading, Pa., U.S.A.

Plastics Engineering in Action

NYLONS • TFE-FLUOROCARBONS • OTHER PREMIUM PLASTICS

Circle 531 on postcard, page 33

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

Tote boxes can be used for hauling parts from one department to another, or for storing parts for later use.

are designed for either stacking or nesting, are light weight and resistant to scuffing, oil and grease. *From a release of Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.*

Safety Check List for Steam Hose

THE FOLLOWING safety rules should be observed when using steam hose:

1. Select the correct hose for the job. Rated working pressures and temperatures must not be exceeded.
2. Use proper couplings. Interlocking, clamp-type couplings are best because they can be tightened as necessary.
3. Use pipe between steam generator and saturated steam hose to protect the hose from local superheat conditions.
4. Avoid sharp bends in hose.
5. Protect hose from crushing by industrial trucks and heavy machinery.
6. Inspect hose frequently. Recognize danger signs which precede hose failure, i.e. cover deterioration, blisters, restricted or brittle tube, leaking steam.
7. Wear safety clothing when using steam hose; safety glasses, gloves, rubber boots, rubber apron reaching below the boot tops.
8. Grasp hose firmly at or near the nozzle to keep the hose from whipping.
9. Turn steam on and off at the

'BUFFALO' FG FANS

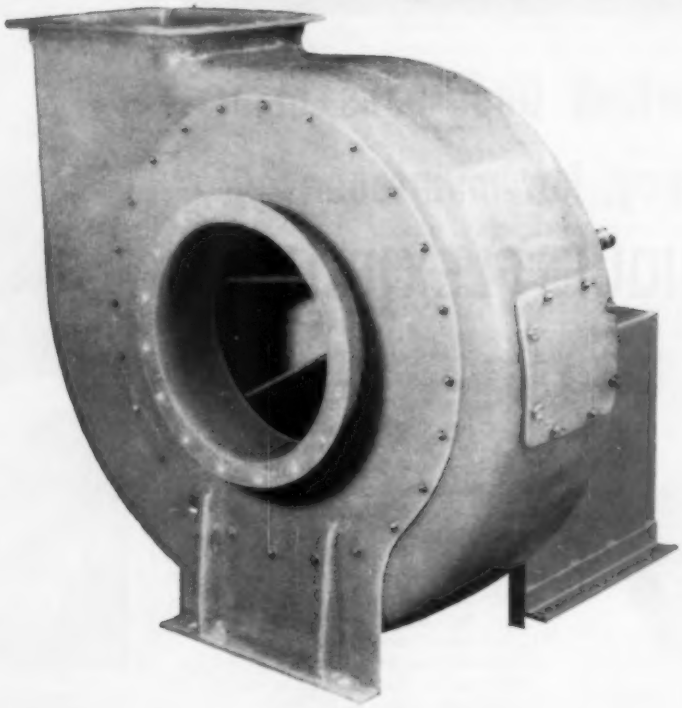
It takes more than an ordinary fan to exhaust many of the highly corrosive fumes encountered today... to do the job at a reasonable cost... and to resist chemical attacks.

'Buffalo' fans, with resin bonded fiber glass housings... fiber glass protected wheels and shafts, are that kind of fan.

Designed for temperatures to 225° F and higher, thermosetting plastics used on 'Buffalo' Type FG fans will not support combustion. They have high impact strength, excellent resistance to a wide range of acids, salts, gases, organic materials and other corrosives. The fans are statically and dynamically balanced to assure vibrationless performance.

A wide selection is available in capacities to 34,000 cfm and pressures up to 10" static. The Buffalo representative in your area can quickly provide helpful information related to your individual requirements. You can save time and money by consulting him.

...Fiber Glass Protection Against Corrosive Fumes



"Buffalo"

AIR HANDLING DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

Circle 532 on postcard, page 33

that Hartzell Duct Fans offer high efficiency, low maintenance and UNIQUE FLEXIBILITY

High efficiency, low maintenance . . . *and* unique flexibility made possible by the use of variable pitch drives which allow you to vary fan speed and air delivery by up to ⅓ through simple adjustment of the driver sheave. That's why Hartzell duct fans are so widely used in industrial duct systems. And these fans are so easy to install, they bolt right into any duct system as quickly and simply as another section of duct work. Belt-drive and direct-connected models in sizes from 12" to 60", plus special Bi-Pass model which can be used to handle air at temperatures as high as 550° F.

Hartzell PROPELLER FAN COMPANY
Division of Castle Hills Corp. • PIQUA, OHIO
HARTZELL

Circle 533 on postcard, page 33

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

source rather than the nozzle; never leave steam hose under static pressure unnecessarily.

10. When turning on steam, point nozzle at the floor until steam flow is adjusted.
11. When using a steam-water mixture, always turn the water on first, then the steam. To cease operation, shut off steam first, then water.
12. Steam hose should not be used to carry other materials and then returned to steam service.
13. Be sure hose is grounded when it is used to clean tanks which have contained combustible materials.
14. Drain hose and wipe the cover dry after use. Store hose in a cool, dry place when not in use. Store flat or on a large radius wall bracket. Never hang over a nail or hook. *From a release of Gates Rubber Co., Denver, Colo.*

Rayon Strapping Holds Tight

For ease of handling the Scio Plant of King-Seeley Div., King-Seeley Thermos Co., Ann Arbor, Michigan, is shipping automotive assemblies and components in cartons held together with Avistrap Strapping. Made of rayon, the strapping is quickly applied to the 4-high pallet cartons and easily removed with scissors or penknife. (From a release of Industrial Packaging Dept., American Viscose Corp., Philadelphia, Pennsylvania.)

YARWAY Ynews briefs

from **Yarnall-Waring Company,** *Philadelphia 18, Pa.*

BRANCH OFFICES IN 19 UNITED STATES CITIES • SALES REPRESENTATIVES THROUGHOUT THE WORLD
STEAM TRAPS STOCKED AND SOLD BY 270 LOCAL INDUSTRIAL DISTRIBUTORS

Valve literally "floats on condensate load"

USE THIS YARWAY STEAM TRAP TO KEEP YOUR DRYERS, COOKERS, TANK COILS AND OTHER PROCESSING EQUIPMENT OPERATING AT PEAK EFFICIENCY

Yarway Series 60 Impulse Steam Traps are the traps "designed with high production in mind." They get processing equipment hotter, sooner—and keep it hot. Here's how:

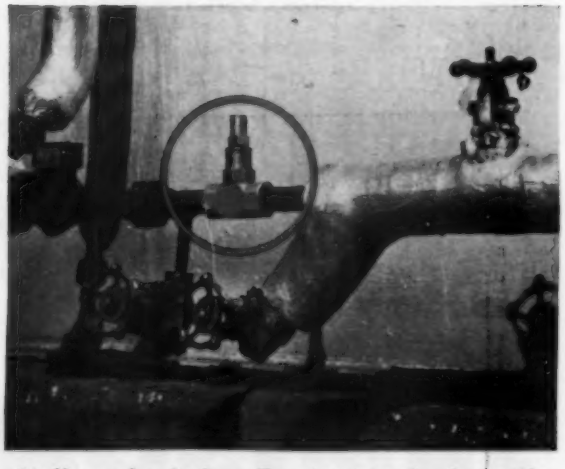
The only moving part, a small stainless steel valve, literally "floats on the condensate load." When equipment is started up, and condensate load is heavy, it opens wide and discharges at full capacity to bring equipment to operating temperature as quickly as possible.

In operation, it continuously senses condensate temperature, discharging each bit of condensate as it forms instead of storing up a bucketful. Result—higher temperatures, more even temperatures, more productive equipment.

Other Yarway features—small size, light weight, good for all pressures, low maintenance, stainless steel.

Yarway pioneered the impulse trap with its unique thermo-dynamic principle over 25 years ago. Most users find among Yarway's full line of impulse traps the profitable and productive solution to their steam trapping problems—you can too!

You can get Yarway's latest steam trap Bulletin T-1743, or a free 60-day trial of any Yarway Steam Trap, by writing Yarnall-Waring Company or contacting your local Industrial Distributor.



¾" Yarway Impulse Steam Trap draining tank coils on sulfur storage tank, 175 lbs. pressure

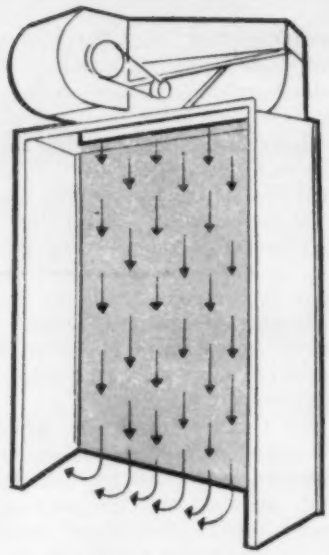
YARWAY OFFERS IMPULSE STEAM TRAPS FOR THESE SPECIFIC OPERATING CONDITIONS

AVERAGE CONDENSATE LOADS	EXTRA HEAVY CONDENSATE LOADS	LIGHT CONDENSATE LOADS
Series 60	Series 40	No. 30

Circle 534 on postcard, page 33

AIR ISOLATOR*

***opens** doorways to unlimited traffic*



Air Isolator is available for openings up to 8′ wide, 10′ high.

Traffic speeds through "open" door as Air Isolator immobilizes movement of air between the two areas.

***screens out** heat, cold, humidity, dust, odors, insects*

• AIR ISOLATOR is the proven and practical answer to high volume traffic problems between two areas of different temperature or humidity.

AIR ISOLATOR provides a high velocity curtain of vertical air across open doorways to form a shield between outside and inside air. During periods of heavy traffic, doors can be opened and left open. Traffic moves faster; dust, cold, heat, odors or insects are repelled; worker comfort is assured.

* registered trademark and product of Lehigh, Inc.

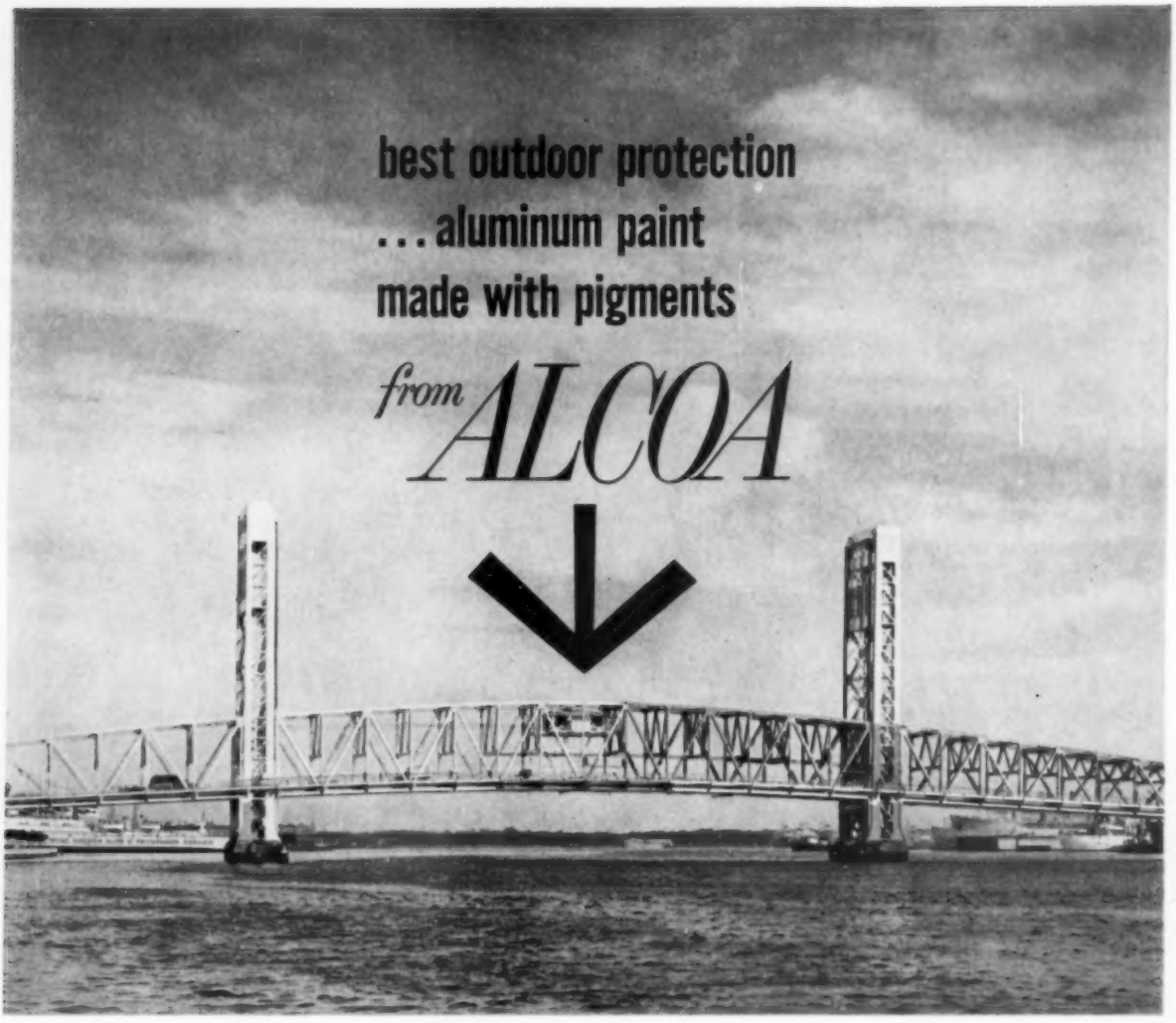
WRITE FOR INFORMATION

Complete data on the economical Air Isolator is yours for the asking. Write today to Jamison Cold Storage Door Co., Hagerstown, Md.

JAMISON

COLD STORAGE DOORS

Circle 535 on postcard, page 33



Look at a Florida bridge after a coat of Dozier & Gay Aluminum Paint

One of the sights of North Florida, the handsome Alsop Bridge carries Routes 1 and 90 across the St. Johns River. The fresh gleam you see is a recent over-all coat of D & G Aluminum Paint, made with ALCOA® Pigments by Dozier & Gay Paint Co., Jacksonville, Fla. They'll tell you nothing stands up under the hot Florida sun like good aluminum paint.

Lasting beauty and low maintenance make aluminum paint the outdoor choice of most maintenance men. Best protection on weather-exposed metal surfaces, a good aluminum paint like D & G is economical, has remarkable hiding power, can be touched up without objectionable color contrast. And at night, reflective aluminum paint is highly visible—an important safety factor.

ALCOA does not make paint, but ALCOA Pigments are used in more aluminum paint than any other brand. These paints actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes. For more information about all types of aluminum paints and coatings, please send the coupon.

Entertainment at its Best . . . **ALCOA PREMIERE**
with Fred Astaire as Host . . . Tuesday Evenings, **ABC-TV**

ALCOA ALUMINUM

PIGMENTS, PASTES & POWDERS

Aluminum Company of America
1751-L Alcoa Building, Pittsburgh 19, Pa.

Please send your free booklets:

☐ Painting With Aluminum
☐ Aluminum Roof Coatings Make Time Stand Still

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Company_____

Address_____

City_____ Zone____ State_____

Circle 536 on postcard, page 33

Wisconsin Motor combats rising

At Wisconsin Motor, 250 new engines are tested in this run-in room simultaneously. A special Mobil run-in oil used during testing leaves a protective coating that guards against rust during shipment and storage and provides initial lubrication when engines are started up in the field. The special non-gumming Mobil gasoline used in testing leaves no residue . . . eliminates the need for draining carburetor and gas bowl.

Mobil

costs with help of Mobil Program!

World's largest manufacturer of heavy-duty, air-cooled gasoline engines reduces maintenance expense by $25,952 per year!

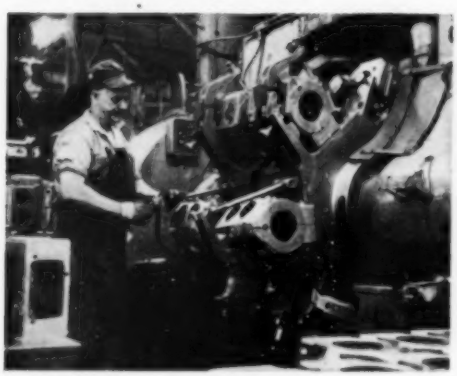
Wisconsin Motor Corporation, Milwaukee, Wisconsin, is the world's largest manufacturer of heavy-duty, air-cooled gasoline engines. To help combat today's rising operating costs while maintaining its reputation for high quality products, Wisconsin Motor looks to a continuing Mobil Program of Correct Lubrication.

Through installation of preventive maintenance and lubrication schedules plus recommendations for improved handling and application of lubricants, the Mobil Program brought about a reduction in maintenance cost of $25,952 in 1960.

Your plant, too, could benefit from such a continuous cost-reducing program. For full information about the Mobil Program, contact your Mobil Representative, or write, Mobil Oil Company, 150 East 42nd Street, New York 17, N. Y.

Mobil charted all machinery in the Wisconsin Motor Plant and set up a program of scheduled lubrication and preventive maintenance. As a result, two maintenance men were freed to handle other duties with savings of $7,663 annually. A Mobil suggestion on handling and disposal of waste oil and solvents meant additional savings of $1,146.

Mobil Engineers analyzed storage and distribution practices for cutting oil used in screw machines . . . recommended that oil be purchased in bulk and piped directly to machines. Considerable savings were realized through quantity delivery discounts and reduced oil handling costs. Savings in 1960 totaled $7,855.



Careful adherence to specially developed Mobil lubrication and PM procedures reduced maintenance on rotary mills used in machining and finishing crankcase castings where an oil reservoir contamination problem was encountered. Savings: $2,507 yearly.

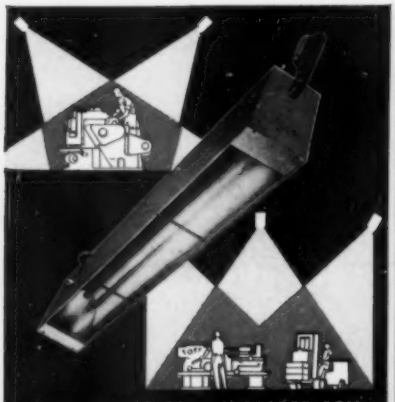
Mobil recommended proper way oils and spindle lubricants . . . established correct application schedules, reducing scoring problems and maintenance costs on grinders and broaches. Annual savings to Wisconsin Motor: $6,781.

Correct Lubrication

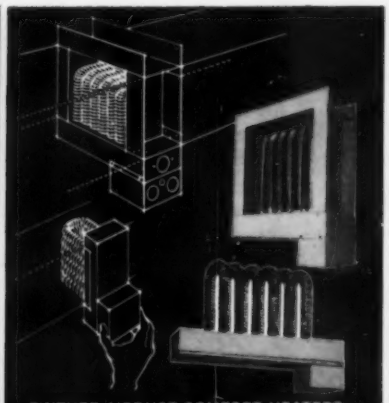
Circle 537 on postcard, page 33

CHROMALOX ELECTRIC COMFORT HEATING

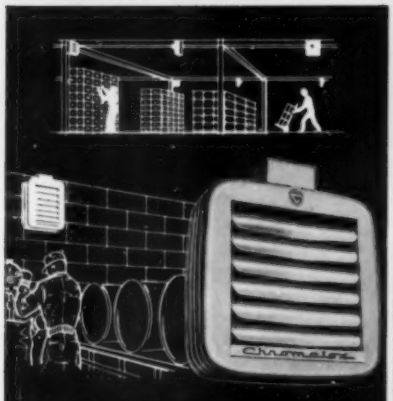
Clean, low cost, draft-free, maintenance-free heat for every imaginable comfort heating problem



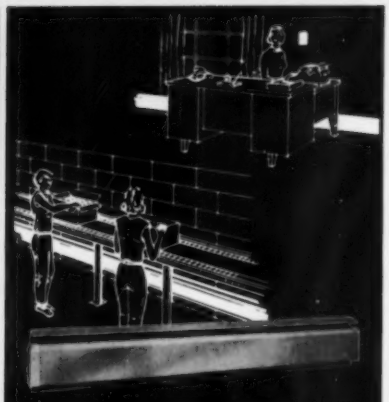
CONTROLLED BEAM INFRARED COMFORT HEATERS — Beam the heat where it's needed into exact "working zones" indoors or out. Positive comfort, easy installation, weatherproof.



FINTUBE AIRDUCT COMFORT HEATERS — The ideal heat source for central heating and cooling systems or for room-by-room, building-by-building temperature control, in new and old duct systems.



HEAVY-DUTY UNIT HEATERS — Keep men and materials at the right "working temperatures" for efficient production in large areas. For wall or ceiling mounting.



ELECTRIC BASEBOARD HEATERS — Uniform, clean, draft-free heat. Ideal for eliminating cold downdrafts of large window areas or poorly insulated outside walls.

At Your Service . . .

CHROMALOX "Answer Men"

ALBANY, N. Y.	HObart 3-0626
ATLANTA, GA.	TRinity 5-7244
BALTIMORE, MD.	Hopkins 7-3280
BLOOMFIELD, N. J.	EDison 8-6900
BOSTON, MASS.	CEdar 5-8040
BUFFALO, N. Y.	Phone TT6-4000
CHARLOTTE, N. C.	FRanklin 5-1044
CHATTANOOGA, TENN.	AMherst 5-3862
CHICAGO, ILL.	Harrison 7-5464
CINCINNATI, OHIO	Trinity 1-0605
CLEARWATER, FLA.	Phone 446-7706
CLEVELAND, OHIO	Prospect 1-7112
COLUMBUS, OHIO	AMherst 7-8260
COLUMBIA, S. C.	Phone 256-6057
DALLAS, TEXAS	Riverside 8-9004
DAVENPORT, IOWA	Phone 326-5233
DENVER, COLORADO	Glendale 5-3651
DES MOINES, IOWA	CHerry 3-1203
DETROIT, MICH.	KEnwood 8-2100 ELgin 7-0677
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KANSAS CITY, MISSOURI	Victor 2-3306
LOS ANGELES, CAL.	LUdlow 9-6321
MIDDLETOWN, CONN.	Diamond 6-9606
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NEW YORK CITY, N. Y.	WOrth 4-2990
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ROCHESTER, N. Y.	HAmilton 6-2070
ST. LOUIS, MISSOURI	Chestnut 1-2433
SAN FRANCISCO, CAL.	Underhill 1-3000
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Chromalox Electric Comfort Heating Equipment gives quiet, clean, safe, maintenance-free comfort. It costs less to install; and because chimneys, ducts, boilers and boiler rooms are eliminated—you have more usable work area. Whether your needs are for heating entire buildings, for spot comfort heating in exposed areas, for portable units for temporary use, for ceiling mounted radiant or unit heaters, for permanent built-in perimeter baseboard panels, fan-driven wall insert heaters or unit ventilators . . . there is a Chromalox electric heating system which efficiently and economically solves your needs. Get in touch with your representative for more information.

FOR MORE INFORMATION
Write for Catalog F-975E.
It gives answers to permanent or temporary efficient electric comfort heating—indoors or outdoors.

WI-34

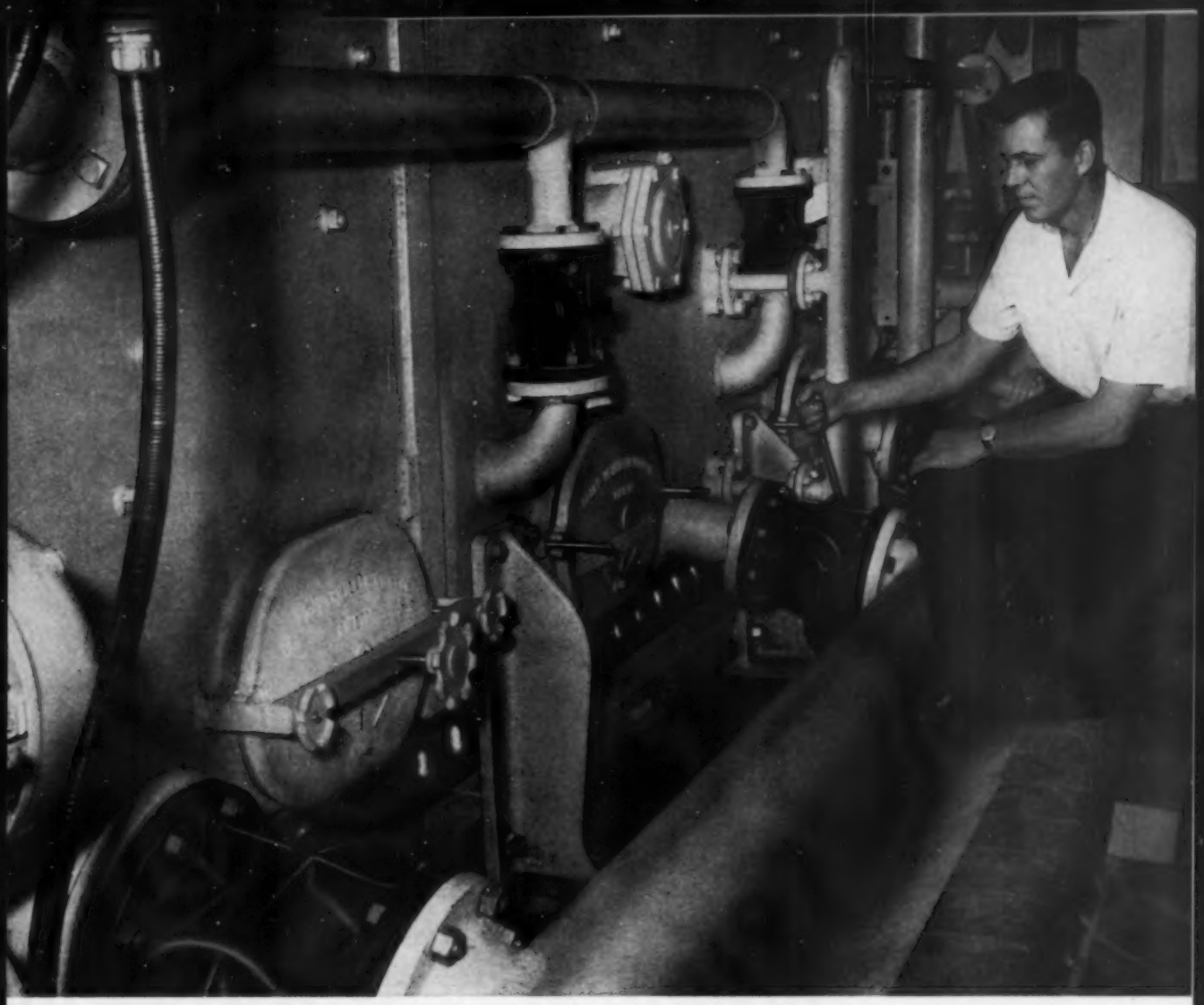
EDWIN L. WIEGAND COMPANY
7553 THOMAS BLVD., PITTSBURGH 8, PA.

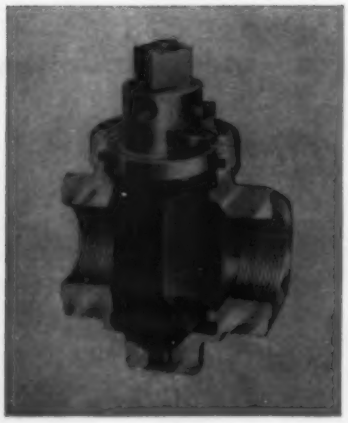
CHROMALOX — FIRST NAME IN ELECTRIC HEAT

CHROMALOX ELECTRIC HEAT

PROCESS COMFORT

Circle 538 on postcard, page 33





BROKEN GLASS AND PAPER WON'T CLOG THIS VALVE

W-K-M ACF Non-Lubricated EC Plug Valve

Many valves were tried for the tough job of controlling the flow of a caustic washing solution that often contained bits of bottle glass and labels, but W-K-M's EC Plug Valve was the only one that could do the job successfully.

We admit this is a problem you don't run into every day, but it's a good indication of the effectiveness of the W-K-M EC Plug Valve. Whatever type of service this valve is applied to it gives a tight seal that can be adjusted on the line when wear develops. Further it excels in the handling of solid bearing liquids or gases since its elastomer coated plug resists even severe abrasive action. The W-K-M EC Plug Valve requires no regular maintenance since it is non-lubricated.

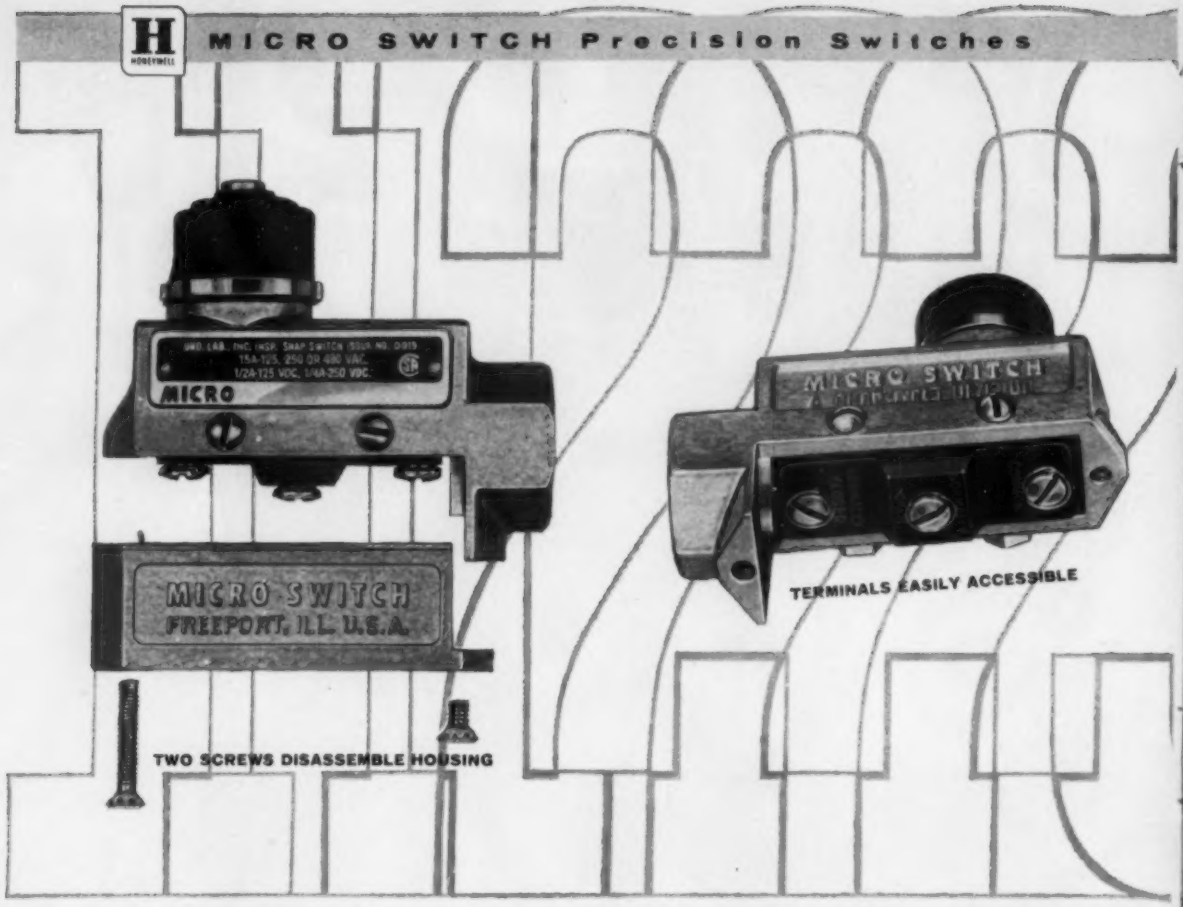
Write for specification sheet AE-1061 for full details.

WHEN SO MUCH DEPENDS ON A VALVE...SPECIFY W-K-M ACF

W-K-M
DIVISION
ACF INDUSTRIES

P. O. BOX 2117 HOUSTON, TEXAS

Circle 539 on postcard, page 33

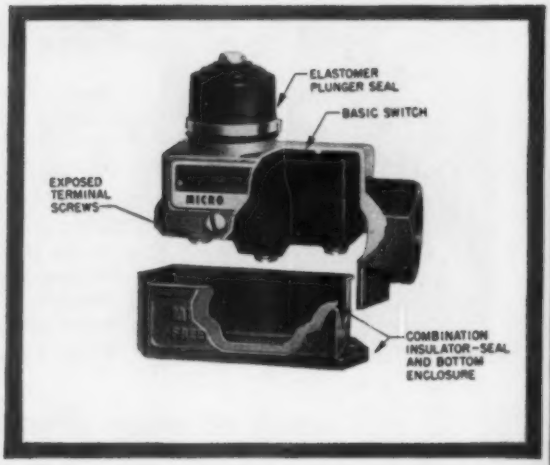


Now...fast, easy wiring in

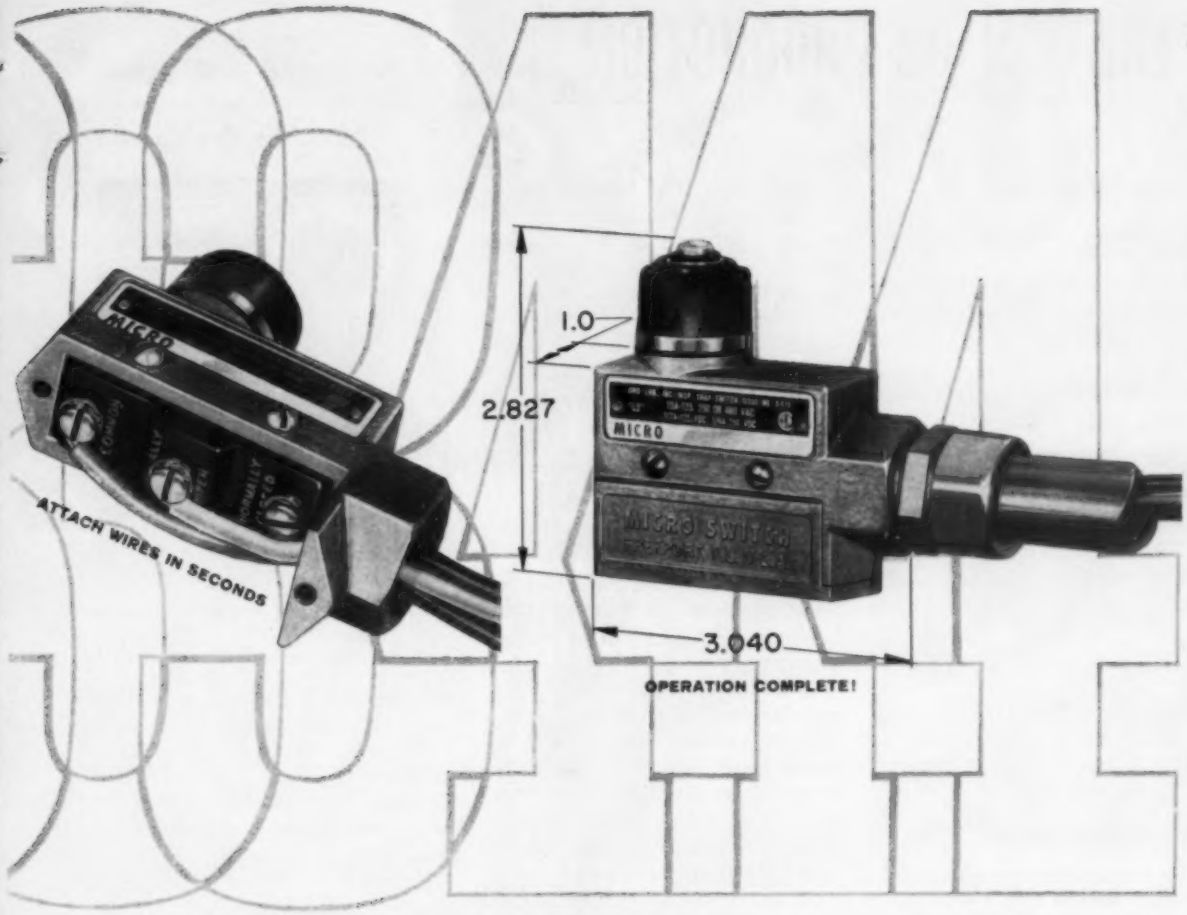
Quick and easy...a few turns of the screwdriver put switch terminals out in the open for fast wiring. The combination insulator-seal liner is permanently fastened in the bottom half of housing—can't drop out, be forgotten, or installed wrong. Even the conduit hub is hex-shaped for faster installation.

The extra-rugged "E6" and "V6" die-cast housings are sealed against dirt and oil splash. The basic switch is built for MICRO SWITCH precision action for millions of operations.

You can get these small easy-to-use switches from your nearby authorized distributor of MICRO SWITCH products. He stocks a full line of snap-action switches with a wide range of actuators and operating characteristics. See the Yellow Pages.

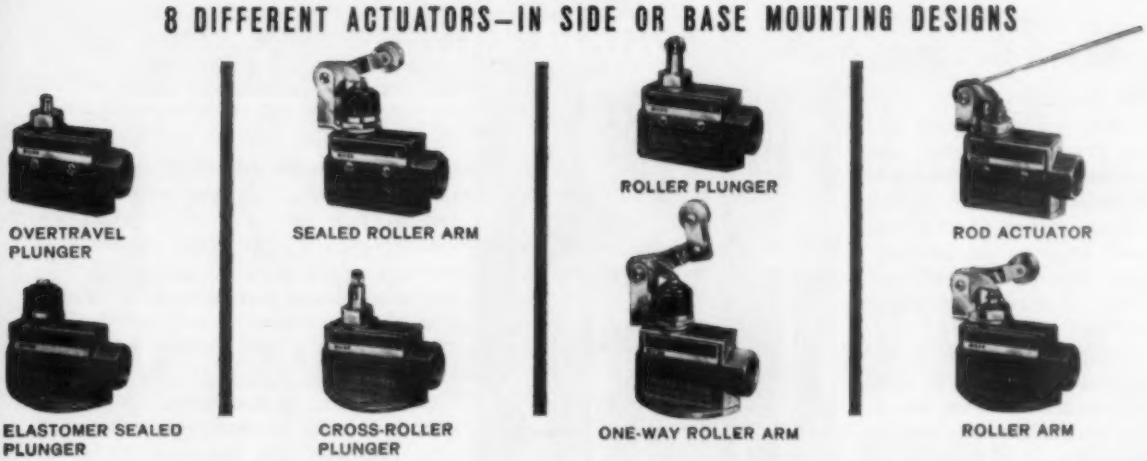


WRITE FOR CATALOG 83–20 PAGES OF HELPFUL INFORMATION ON ENCLOSED SWITCHES



"E6" and "V6" enclosed switches

8 DIFFERENT ACTUATORS—IN SIDE OR BASE MOUNTING DESIGNS



OVERTRAVEL PLUNGER

ELASTOMER SEALED PLUNGER

SEALED ROLLER ARM

CROSS-ROLLER PLUNGER

ROLLER PLUNGER

ONE-WAY ROLLER ARM

ROD ACTUATOR

ROLLER ARM

MICRO SWITCH, FREEPORT, ILLINOIS
A division of Honeywell
In Canada: Honeywell Controls, Limited, Toronto 17, Ontario

Honeywell
MICRO SWITCH Precision Switches

Circle 540 on postcard, page 33

OPERATION AND PRODUCTION—pointers for the industrial plant engineer

Edited by Ken Lawson

Extrusions Cut On-the-go

By N. B. Barsha, Production Control Manager Cupples Products Corporation, St. Louis, Mo.

CUTTING EXTRUDED aluminum sections moving on a runout table was accomplished by use of a standard stone traverse saw.

The traveling-saw carriage is equipped with upper and lower grooved wheels so that it cannot be derailed and it rides on 6-ft long inverted-angle tracks located on each side of the runout table.

A stone traverse saw cutting extruded aluminum moving on a runout table.

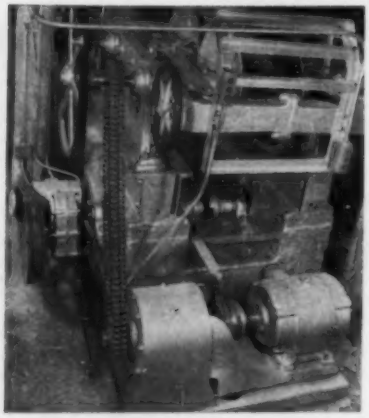
As the operator is starting his cut he pushes the carriage assembly forward at approximately the speed of the extrusion. The forward motion of the carriage will assume this extrusion speed once the cut is started. The extrusions leaving our press vary in speed from 1½ ipm to 22 ipm.

A Simonds Si-Maloy Steel, nonferrous metal cutting blade is being used. With the saw operating on a 3 shift, 5 day a week schedule a blade is used two to three weeks before it needs sharpening.

Dry Fluid Drive Gives Overload Protection

A BELT-STRETCHING machine designed and built by Imperial Belting Company, Chicago, Illinois, required costly repairs whenever gears or shafts were broken by overloads or jams during operation. They have eliminated this maintenance expense and obtained better control of jogging and threading by introducing two Flexidyne Dry Fluid Drives, made by Dodge Manufacturing Co., into the power transmission system.

This drive system employs a unique mechanical principle to achieve soft starts and provide overload protection for the motors. The "fluid" consists of hardened steel shot, a measured amount of which is contained in the coupling's housing keyed to the motor shaft. As the motor starts, centrifugal force throws the flow charge to the periphery of the housing, where it packs between housing and a crimped rotor blade, which transmits power to the load. Slippage at start is followed by gradual engagement, so that 100 per cent efficiency is achieved at full load speed.



Drive assembly powers a machine used for stretching stitched and treated canvas conveyor and elevator belt.

Scrap Handling Simplified

NINETY self-dumping hoppers have reduced man-hours required for scrap handling and increased over-all efficiency at the Rome, N. Y. plant of the Rome Cable Division of Aluminum Company of America.

A change in scrap processing techniques necessitated a more efficient means of handling trimmings and other scrap resulting from manufacture of bare and insulated wire.

Formerly all insulation had to be burned off wire, and the wire baled, before it could be shipped to a scrap metal refinery. Two men were assigned full time to collect scrap throughout the plant. They dumped scrap into large wooden boxes mounted on wheels and pushed the boxes to the incinerator or baler.

Now, with a new refinery agreement, all scrap is shipped out in the same form as it is collected. After eliminating the incinerating and baling processes, the company made scrap handling a departmental responsibility and re-assigned the two scrap handlers to other jobs.

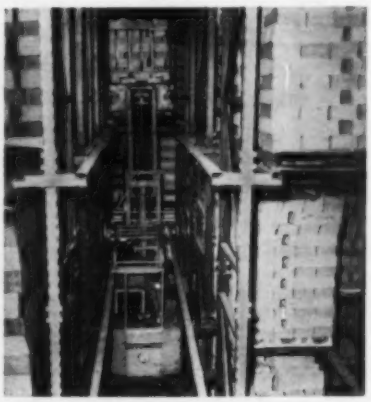
Hoppers were selected for the job

Drive-In Pallet Rack Boosts Storage Capacity

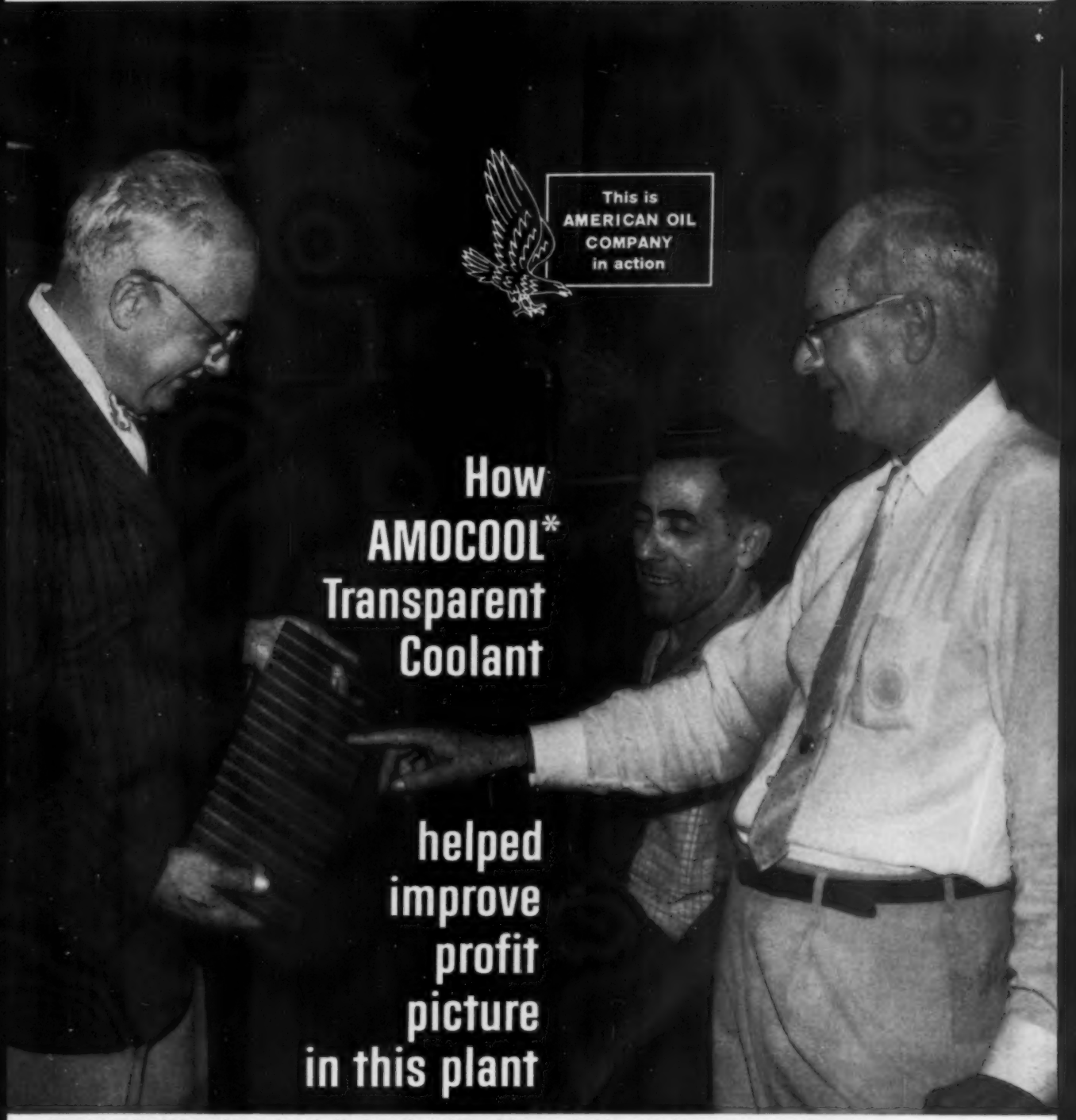
YOU CAN literally stack it in the aisles by using this unique rack idea the Kable Printing Company, Mt. Morris, Illinois set up for storage of palletized loads. The rack is suitable for any storage system where a "last in, first out" sequence can be used.

Note that this truck actually enters the rack and drives to the end to deposit the load. The second load is placed directly below the first, and so on, until the entire row is filled.

The length of the rows can be varied to accommodate individual requirements, with short rows in one direction and long rows in another. The only permanent aisle needed is outside the rack area where the lift truck turns into each row.



Illustrated is an Automatic electric truck, only 40 in. wide, stacking a pallet load on the rack's third tier.



How AMOCOOL* Transparent Coolant helped improve profit picture in this plant

Eliminate reworking because of rust, reduce wheel loading and extend intervals between wheel dressings; do these and you increase profit per unit, explains Detroit Edge Tool president, Dan Ebbing, to P. E. "Pappy" Stratton of American Oil. Sam Vineh, operator, looks on.

by PAUL E. "PAPPY" STRATTON

About the Author.

"Pappy" Stratton has been providing technical help on lubrication and metalworking problems to customers in the Detroit area for nearly all of the twenty-five years he has been working for the company. In addition to having this store of practical experience to help him, Pappy has completed the Company's Sales Engineering School.

☆ ☆ ☆

By using a soap-base grinding compound, Detroit Edge Tool Company was getting excessive corrosion and rust on work and grinding machines. Oil vapor was collecting on machines and on the ceiling, causing dirty working conditions. Most important, high wheel loading was causing frequent down-time for wheel dressings.

We worked out a test program on AMOCOOL Transparent Coolant with the management. On our first test on one surface grinder, feed pressure was cut substantially while at the same time metal removal was increased.

The cost of reworking parts to remove rust was eliminated. Time required to clean machines to get rid of the odor was cut in half. Less wheel loading and fewer wheel dressings have upped production and reduced costs. Our test program paid out in an improved profit picture. All grinding and drilling equipment has been converted to AMOCOOL Transparent Coolant.

☆ ☆ ☆

Would you like this kind of technical help to assist you in improving profits? Get it by calling the American Oil Company office nearest you.

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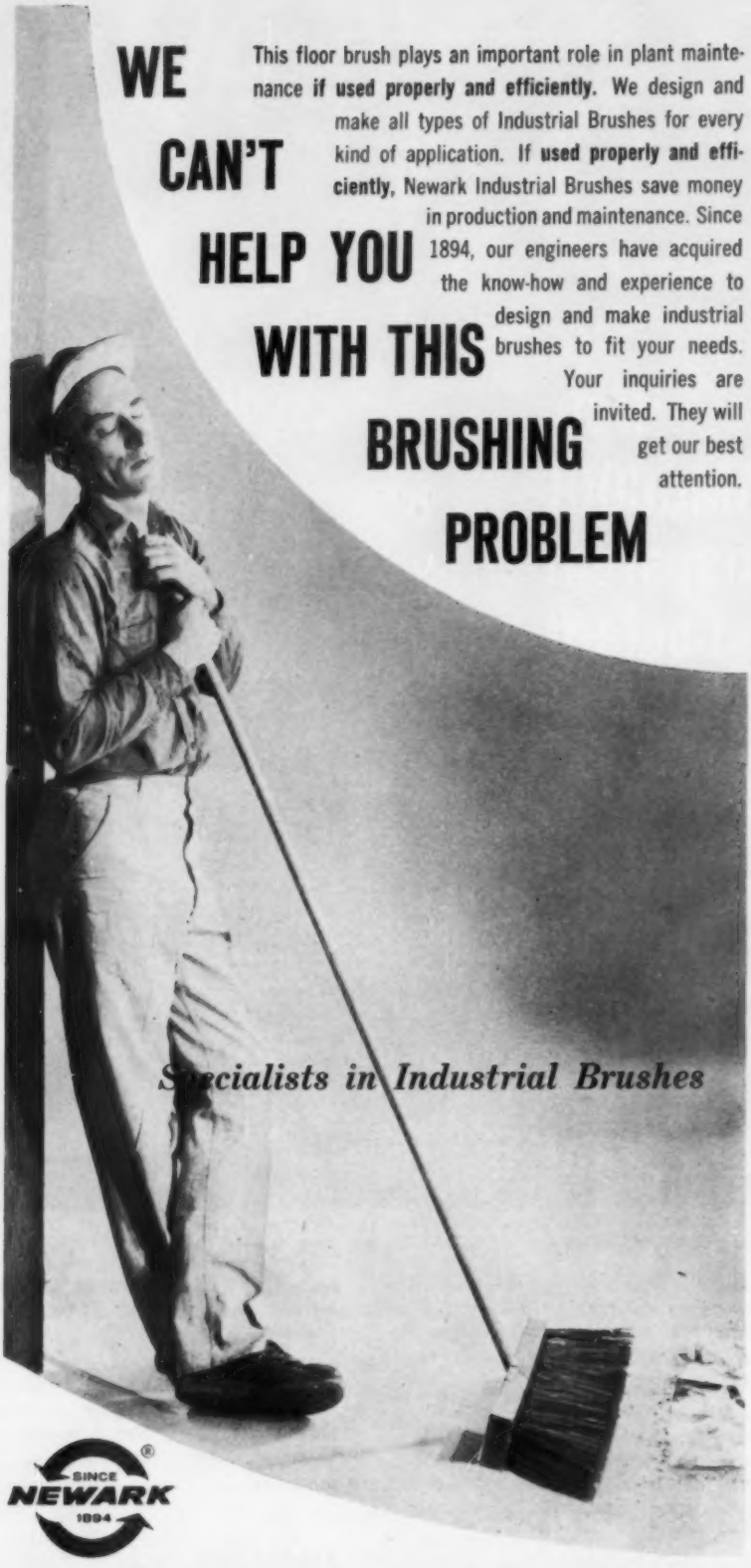
AMERICAN OIL COMPANY

AMERICAN

910 SOUTH MICHIGAN AVENUE
CHICAGO 80, ILLINOIS

Circle 541 on postcard, page 33


WE CAN'T HELP YOU WITH THIS BRUSHING PROBLEM
This floor brush plays an important role in plant maintenance if used properly and efficiently. We design and make all types of Industrial Brushes for every kind of application. If used properly and efficiently, Newark Industrial Brushes save money in production and maintenance. Since 1894, our engineers have acquired the know-how and experience to design and make industrial brushes to fit your needs. Your inquiries are invited. They will get our best attention.
Specialists in Industrial Brushes
SINCE NEWARK 1894

Leadership Proved Through Performance! 59-84

NEWARK BRUSH COMPANY

260 MICHIGAN AVE., KENILWORTH, N. J.

Circle 542 on postcard, page 33

OPERATION—PRODUCTION

(O and P begins on page 58)

Hoppers are located at scrap generating areas throughout the plant and on a regular schedule are picked up by fork trucks and emptied into boxcars.

because they are easily handled by fork lift trucks already available in each department. These are positioned in scrap generating areas and, where possible, are placed to collect trimmings and other scrap as it drops from cutters.

A fork truck picks up hoppers on a "demand" schedule and empties them into a boxcar. Only one man, the fork truck operator, is required for handling and dumping hoppers.

Powder Lance Cuts Wall

A DRAMATIC PROCESS called powder-lancing helped to complete an unusual demolition project at Hill Air Force Base near Ogden, Utah, by slicing through an 18-in. thick reinforced concrete wall in record time. A single operator can cut a 10 ft by 10 ft opening in this wall in one eight-hour day at a cost of $352.00.

In this process, developed by Linde Company, Division of Union Carbide Corporation, a special mixture of iron and aluminum powder is fed pneumatically through lengths of black iron pipe fitted into a lance handle with one or more lengths of consumable black iron pipe attached. The powder and oxygen are mixed in the pipe ahead of the handle, carried to the cut by the pipe, and ignited to produce an intensely hot reaction which melts the concrete. Cuts in concrete up to 12 ft thick have been made with the lance and theoretically

This mark tells you a product is made of modern, dependable Steel.

One slip can cost more than USS Multigrip—$100,000 for a single fall

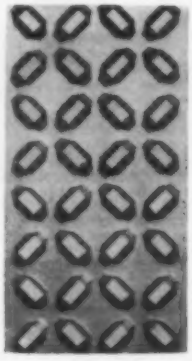
Sound fantastic? There are actual cases involving suits for $100,000 or more for single falls. The average cost of injuries from slips and falls is lower than that, of course. In six states surveyed recently, the cost per fall averaged close to $1000.

You can eliminate many slips and falls by giving your workers a floor studded with cleats—USS Multigrip. This rolled steel floor plate provides safe traction in any direction. The cleats are flat on top, easy to walk on—and do not catch the shoe.

For machine shop decks, loading platforms, catwalks, and other dangerous locations, USS Multigrip Floor Plate supplies safety plus.

Where floors take a heavy beating from traffic, Multigrip will stand up for years under constant use. Oil and water won't soak in and can be easily removed from the surface with regular cleaning materials. You save money by having a floor that is easy to sweep or flush clean—and there's little or no maintenance.

On your next inspection trip, search out the danger spots—and make them safe with USS Multigrip Floor Plate. You get fast delivery of any size from your Steel Service Center. For further information write United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.



United States Steel Corporation • Tennessee Coal and Iron Division • Columbia-Geneva Steel Division • United States Steel Export Company

USS United States Steel

TRADEMARK

The *right* extension cord is essential for safe, dependable operation of on-the-job equipment and temporary lighting . . . the *right* size to carry the load, the *right* length to supply the power without voltage drop. That's why there's a Royal heavy-duty POWR-KORD to fit *every* job. Available in one quality (the very best) . . . two types (rubber and vinyl) . . . three colors (red, black, yellow) . . . four wire sizes (12, 14, 16, 18) . . . and over five handy cord lengths (10 to 100 ft.). See your wholesaler. He has the facts — and Royal POWR-KORDS in stock, ready for your work.

ROYAL ELECTRIC
...an associate of ITT

ROYAL ELECTRIC CORPORATION
PAWTUCKET, RHODE ISLAND
In Canada:
Royal Electric Company (Quebec) Ltd., Pointe Claire, Quebec
Circle 544 on postcard, page 33

OPERATION—PRODUCTION

(O and P begins on page 58)

Concrete-cutting torch throws off a shower of sparks as it burns through 18-in. thick reinforced concrete wall.

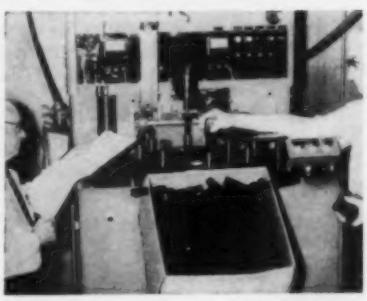
there is no limit to the thickness that can be cut.

This operation consumed 3600 cu ft of oxygen per hour, 293 cu ft of nitrogen for the pneumatic powder dispenser per hour, and 100 lb of iron-aluminum powder per hour. One-half inch black iron pipe, used in 18-ft lengths, was expended at the rate of one foot per inch of concrete cut.

Electronically Tests and Color Codes Springs

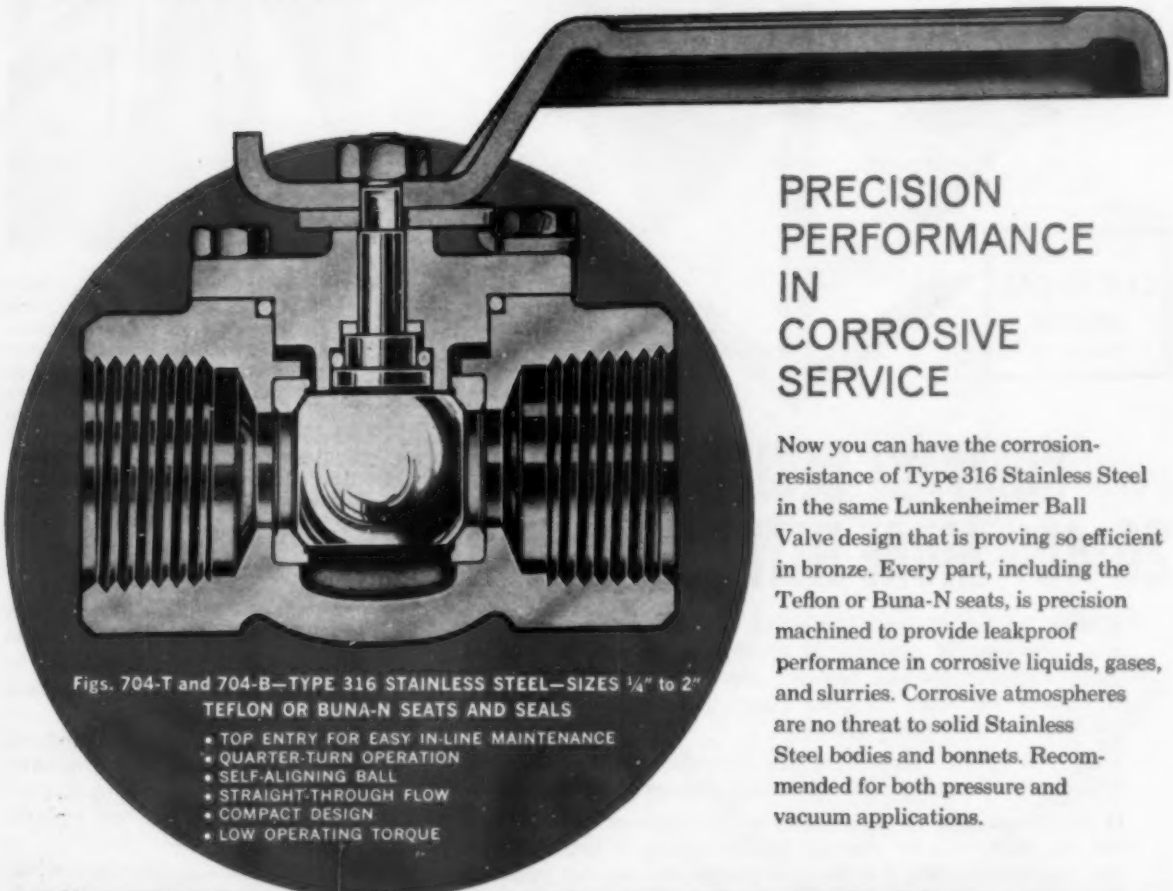
A COIL-SPRING testing machine, which automatically checks, classifies and color codes oil pressure regulator valve springs, has recently been installed at the Ford Motor Company's Livonia plant.

This electro-mechanical device, capable of checking 600 springs an



Automatic transmission regulator valve springs are shown being loaded manually for automatic electronic testing, classification and color coding.

NEW LUNKENHEIMER STAINLESS STEEL BALL VALVE



Figs. 704-T and 704-B—TYPE 316 STAINLESS STEEL—SIZES ¼" to 2"
TEFLON OR BUNA-N SEATS AND SEALS

- TOP ENTRY FOR EASY IN-LINE MAINTENANCE
- QUARTER-TURN OPERATION
- SELF-ALIGNING BALL
- STRAIGHT-THROUGH FLOW
- COMPACT DESIGN
- LOW OPERATING TORQUE

PRECISION PERFORMANCE IN CORROSIVE SERVICE

Now you can have the corrosion-resistance of Type 316 Stainless Steel in the same Lunkenheimer Ball Valve design that is proving so efficient in bronze. Every part, including the Teflon or Buna-N seats, is precision machined to provide leakproof performance in corrosive liquids, gases, and slurries. Corrosive atmospheres are no threat to solid Stainless Steel bodies and bonnets. Recommended for both pressure and vacuum applications.

LUNKENHEIMER®
THE ONE *Great* NAME IN VALVES
• BRONZE • IRON • STEEL • PVC

LUNKENHEIMER L QUALITY

Get Circular 612 from your distributor or The Lunkenheimer Co., Cincinnati 14, Ohio.

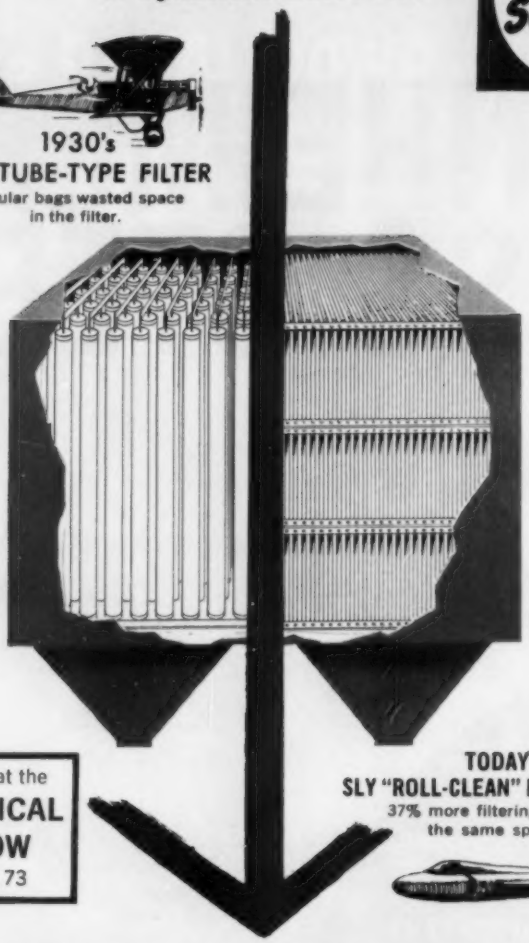
L-561-24

Circle 545 on postcard, page 33

Check the Advantages
of Dynaclone® Dust Filters

SINCE 1924 SLY

1930's
SLY TUBE-TYPE FILTER
Tubular bags wasted space in the filter.



See Us at the
CHEMICAL
SHOW
Booth 73

TODAY
SLY "ROLL-CLEAN" DYNACLONE:
37% more filtering area in the same space.

COMPACT DESIGN MEANS 20-40% MORE FILTERING CAPACITY

Modern flat bag design is one reason why Sly outperforms other dust collectors. It provides 20 to 40% more cloth in a given space — greater filtering capacity per cubic foot of filter. The Dynaclone and other Sly Dust Filters fit in where others can't. Yet bags are more easily accessible.

The "Roll-Clean" Dynaclone also operates continuously, provides *constant* suction at dust sources for complete dust suppression.

It is automatically self-cleaning. The roller cleaner seals off bags one row at a time for cleaning by reverse air. A single exhaust fan provides suction for dust collection *and* air for cleaning. There are no auxiliary blowers.

And "Resist-O-Wear" bags give 2 to 3 times longer life on the most demanding applications.

Check *all* the Dynaclone advantages . . . *Send for 36-Page Catalog 104.*

"Roll-Clean" Dynaclone: Patents 2,867,289, 2,938,598. "Resist-O-Wear" Filter Bags: Patent 2,959,247.

THE W. W. SLY MANUFACTURING CO.

4600 Train Avenue • Cleveland 1, Ohio • Offices in Principal Cities • Overseas Licensees: Andrew Air Conditioning Ltd., London S. W. 1, England • Mideco Pty. Ltd., Nunawading, Victoria, Australia

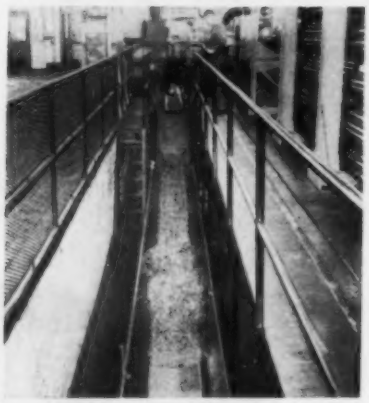
Circle 546 on postcard, page 33

OPERATION—PRODUCTION

(O and P begins on page 58)

hour, was designed and built by RCA Industrial and Automation Division, Detroit, to insure quality performance of automatic transmissions. This machine automatically classifies and color codes acceptable springs into three categories within a total pressure tolerance of 1 psi.

Jamproof Chip Conveyor



This special vibrating-type chip conveyor at the Bucyrus, Ohio, plant of The Timken Roller Bearing Company, is used for delivering chips from the screw machine area to truck bed located outside the building. It is mounted on reeds which are set into vibration by a motor-driven cam. It is timer-operated and at present, about one tractor-trailer load of chips is gathered for each eight-hour shift.

Plastic Stops Chain Kinking

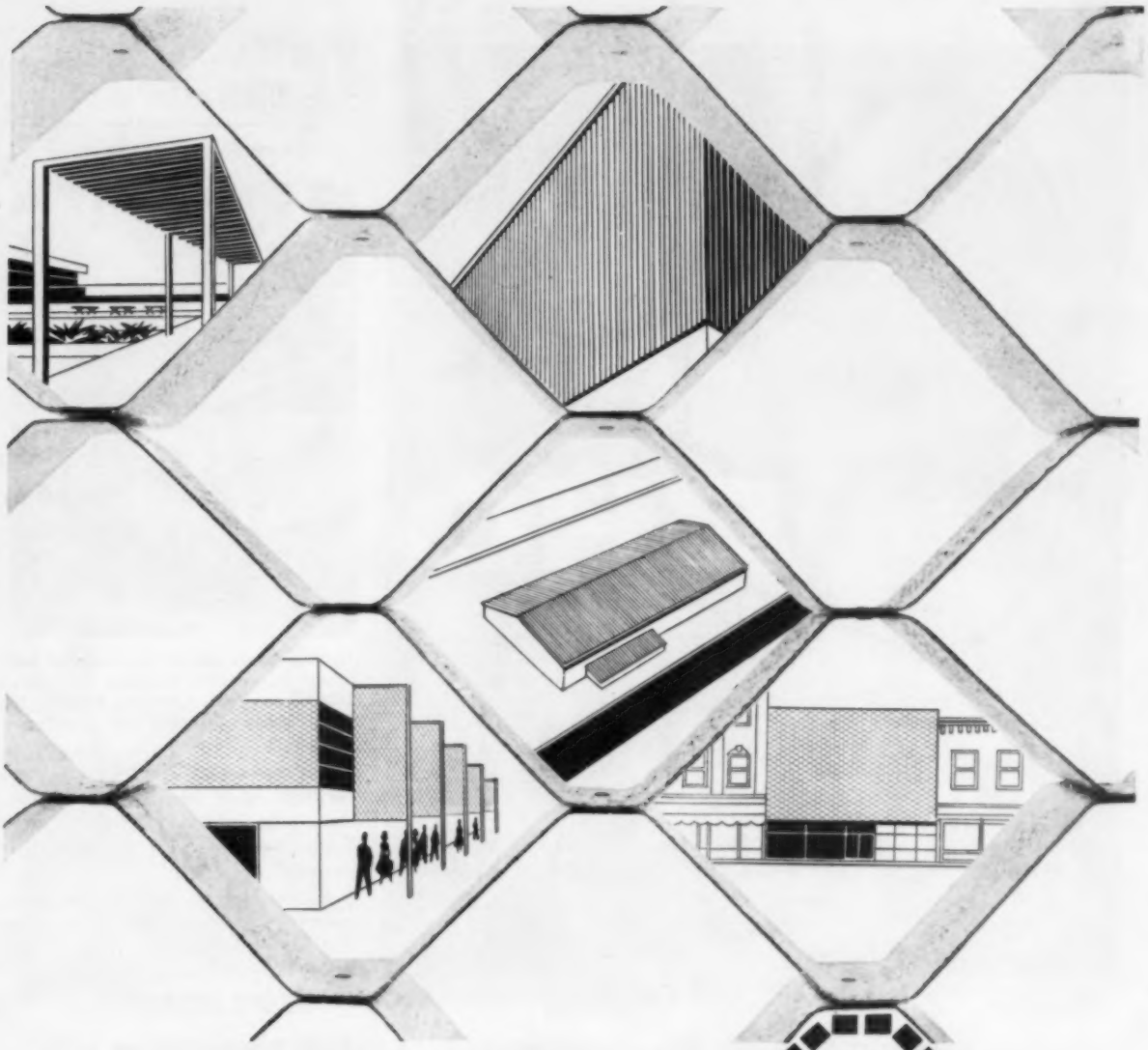
A CHAIN DRIVE in the freezing room of Grill Meats, Inc., Sandusky, Ohio plant created a problem because the lubricant would freeze affecting chain and sprocket engagement.

The standard chain also produced metal chips, which were eventually picked up by food handling machinery, if the chain was not replaced regularly.

This problem has now been solved by the installation of steel roller chain equipped with Delrin stud bushings, replacing a standard roller chain.

The Unisyn chain made by Union Chain Division of Hewitt-Robins was installed on a drive between a motor reducer and a wire conveyor, handling meat patties, operating at —30 F.

These bushings, having self-lubri-



Alcoa Aluminum V-Beam is style at a saving!

Roofing a plant. Covering walkways. Siding a warehouse. Creating a solar screen. You design it; Alcoa® V-Beam builds it *better* for *less* in the long run.

Simplify things by standardizing on this strong, low-cost, all-purpose sheet. It's lightweight, even in 30-ft lengths; easy to apply, fast. Save again on painting, fixing, replacing with rugged Alcoa V-Beam—handsome and long-lived despite corrosive industrial fumes, coastal atmospheres.

Available in stucco-embossed finish or 11 colors in lasting Alcoa Alumalure® finish. Specifications? See AIA File No. 12-C. Application help? Call your nearest Alcoa sales office, or clip and mail the coupon today.

Aluminum Company of America,
819-L Alcoa Bldg.,
Pittsburgh 19, Pa.

☐ Send more data on Alcoa V-Beam.

Name _____

Title _____

Company _____

Address _____

City _____

Zone _____

State _____

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

Entertainment at its Best . . . ALCOA PREMIERE with Fred Astaire as Host . . . Tuesday Evenings, ABC-TV

Circle 547 on postcard, page 33

Dimensioned to your requirements, this new C. H. Wheeler development is the most modern pump available for the chemical, process, heating, ventilating and air-conditioning industries.

BHO End Suction Centrifugal Pumps are offered in 350 Series (stainless steel and corrosion resistant materials) for chemical and 300 Series (cast iron alloys and bronzes) for general process services.

A complete range of 14 pump sizes from 1" to 5" in both series. The size and type you need to do your job. Available for immediate shipment.

Call your C. H. Wheeler representative for full details or write for 12-page catalog and pump design manual.

WGR

C. H. WHEELER / GRISCOM-RUSSELL

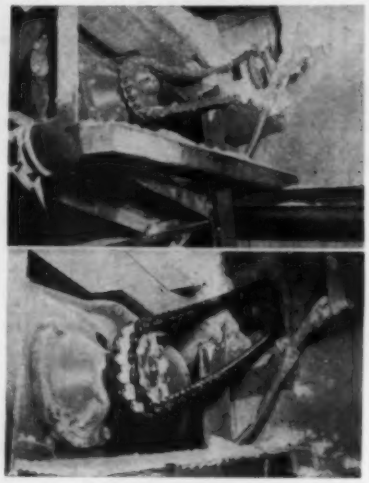
Philadelphia 32, Pa. Massillon, Ohio

Affiliated sources for heat exchangers, steam condensers, pumps, marine auxiliary equipment, sea water distillation plants, nuclear steam generators and related components.

Circle 548 on postcard, page 33

OPERATION—PRODUCTION

(O and P begins on page 58)



Regular chain, above, is elongated and kinky, because of freezing lubricant. Use of self-lubricating bushing in chain below solves these problems.

ing properties not requiring any further lubrication, eliminated kinking of chain joints, and also solved the problem of excessive wear due to metal-to-metal contact.

Robert Heenan, the chief engineer, reports that with five drives now equipped with the new chain he believes that his freezing room conveyor troubles have been solved.

Double-Purpose Container

This Dravo Transportainer has a capacity of 279.5 cu ft or 12,000 lb. Shown loaded at Bethlehem Steel Company's Leetsdale, Pa. plant, it is used first as a container for shipping materials and equipment to structural erection field projects. At the job site it assumes a more important role; as a weathertight, pilferage-free crib.

"It's a WRIGHT Crane...custom-built to our specifications!"

Specifying the right crane for heavy overhead loads is a "tall order," as well as an important capital investment. Before specifications can be drawn, several basic questions must be answered. Where is the crane to be used? What kind of loads will it lift? What design of crane and auxiliary equipment will handle these loads most efficiently? And last, what manufacturer can produce a crane that will meet these requirements?

Hundreds of companies, large and small, have found the best answers to these and other questions at WRIGHT. At WRIGHT, every crane is custom-engineered to assure that all phases of design, construction and operation are perfectly coordinated to the requirements of the job. Factors such as precision control, safety, handling efficiency and operating costs are carefully weighed before final specifications are drafted.

If you have a material-handling problem which calls for customized crane engineering, we invite you to let WRIGHT engineers help you solve it. Please address your inquiries to York, Pennsylvania.

Remember—WRIGHT also makes a standard crane line including motor-driven and hand-operated cranes—top-running and underhung.

WRIGHT CRANES

ACCO

Wright Hoist Division • American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago (Melrose Park), Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Circle 549 on postcard, page 33

This armored cable

All it takes is one heavy blow to damage suspended rigid conduit but USS Tiger Brand Armorlokt Cable rolls with a punch. Because Armorlokt is flexible, it rolls or gives under pressure without damage. It's not often that you need this built-in "give," but it's there and it can prevent cable failure. Armorlokt protects in other ways, too. Corrosive atmospheres are no problem. You can have the cable armored with galvanized steel, stainless steel, aluminum or bronze. Ampyrol (PVC) jackets in color for easy identification are also available. And USS Armorlokt Cable installs as easily as ordinary cable—in one-half the time it takes to install rigid conduit. You can have the type insulation that best fits your actual job

requirements—varnished cambric, rubber, or asbestos in sizes up to four inches in diameter—ratings up to 15,000 volts. There's a standard USS Tiger Brand Cable for every special job. Write for the Armorlokt catalog. American Steel and Wire, Dept. 1448, Rockefeller Building, Cleveland 13, Ohio.

USS, Armorlokt, Tiger Brand and Ampyrol are registered trademarks.

American Steel and Wire Division of United States Steel

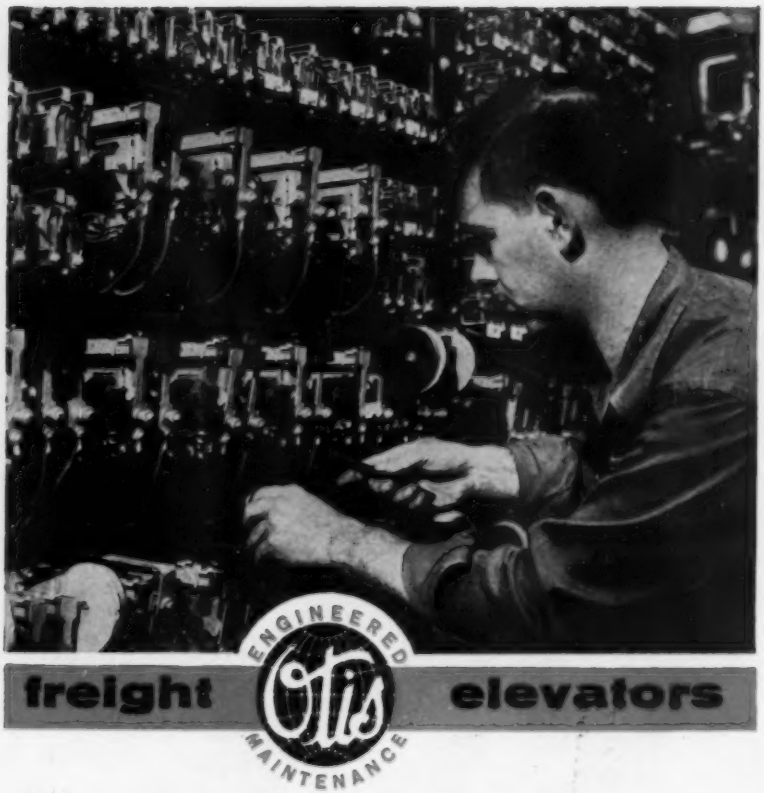
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, Distributors Abroad

Circle 550 on postcard, page 33

Otis

IS ELEVATOR MAINTENANCE COMPLEX?

YES! It is an organization task requiring an unusual combination of skills. Plus a wide knowledge of parts, assemblies, functions, replacement procedures, testing and adjusting. Plus the availability of original replacement parts. Plus immediate local service in emergencies.



OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

You

IS YOUR ELEVATOR MAINTENANCE COSTLY?

OTIS MAINTENANCE SURVEY AND ESTIMATE

OFFICE

BUILDING NAME

Location

City

OWNER

State

Bill to

Location

City

CLASS EXAM. FREQ. STARTING 19

NUMBER AND KIND OF ELEVATORS IN BUILDING:

Pass. Frt. Serv. Hyd. S.W. D.W.

Type of Building

Present Type of Service No. of Apmts.

Frozen Maintenance Estimating Rate @ $

Frozen Straight Time Labor Cost $

Current Straight Time Labor Cost $

Current Metals and Metal Prod. Index Month of

ABOVE RATES ARE FOR OFFICE - L. R.

This Estimate Covers Machines, Kind | Size & Type Machine | Machine Location | Capacity | Speed | Rise Ft. In. | No. Stops | No. Openings

1:1 ☐ SWT ☐ 2:1 ☐ DWT ☐ | Type of Controller 1, 2 Spd. | Type of Operation | Date Installed | Voltage A.C. or D.C. | Machine Number

ROPES	Hoist & Drum Cwt.	Car Cwt.	Comp.	Tiller	Gov
No. & Size					
Used Life (mos.)					
Add. Est. Life(mos.)					
Base					
Rise					
Sub Total					
Life Var. %					
TOTAL					

GRAND TOTAL FOR ONE ELEV. $ FOR ELEVS. $

SPECIAL LABOR HOURS - All Elevators

	Service	Repair
Overtime Callbacks		xxx
Overtime Examination and/or Repairs		
Standby Labor		
Traveling Time		xxx
Miscellaneous		
TOTAL SPECIAL LABOR (HOURS)		

MACHINE BASE COST - One Elevator Only

Service Hrs. @ $1.00 Per Hour Labor Cost

Repair Hrs. @ $1.00 Per Hour Labor Cost

Material Cost

Machine Base Cost for One Elev. @ $1.00 per Hour

Service Hrs. for Items 2 & 4 = 44% Prime Cost ÷ $1.00

Repair Hrs. for Items 2 & 4 = 11% Prime Cost ÷ $1.00

Repair Hrs. for Ropes = 25% Item 5 ÷ $1.00

Total No. Items	APPLIANCES - ALL ELEVATORS	Make	Cond.	Cost
	Selector & Drive			
	Hoistway Leveling Cams & Switches			
	Frt. Type Operators, Type No. Doors			
	Master ☐ Motorized ☐			
	Operators, Pass. Type No. Open			
	Electric ☐ Pneu. ☐			
	Electronic Detector			
	Door Closers, Rizon ☐ Spring Hyd. ☐			
	Interlocks, Elec. ☐ Freight Gate ☐ Bar ☐			
	Car Gates, Solid ☐ Safety ☐ Collapsing ☐			
	Frt. Gates, Wd. ☐ Met. ☐ Ft. In. Wide			
	Hoistway Doors, Swing ☐ Sliding ☐			
	Door Hangers, 1 ☐ 2 ☐ Speed C/O ☐			OMIT
	Annun., Target ☐ Light ☐ No. Ind.			
	Operators Signal			
	Hall Buttons			
	Dial Ind's. Roto ☐ Cir. Illum. ☐ Mech ☐			
	Signal Drive Mechanism			
	Hall Lanterns			
	Hall Position Indicator (Multi-Light)			
	Car Position Indicator (Multi-Light)			
	Starters Indicator Panel			
	Waiting Pass. Indicator, No. Floors			
	Starters Contr. Panel w/ Disp. ☐ w/o			
	Two Car Spacing			
	Signs, Directional ☐ This Car Up ☐			
	Rotary Converters			
	Telephones or Call Bells			
	Fandoliers or Blowers			
	Car Lights, Std. ☐			

SUMMARY - All Elevators

	Serv. Hours	Rep. Hours
1. Machine Base Co		
2. Cost of All App		
3. Total - Cost of		
4. Age Adj.	xx	xx
5. Cost of All Rop		
6. Tot. M. & L. Co	xx	
7. Ser. Hrs. (6)		
Rep. Hrs. (6)	xx	xx
8. Total Special Lab	xx	xx

TOTAL BOOK COST OF

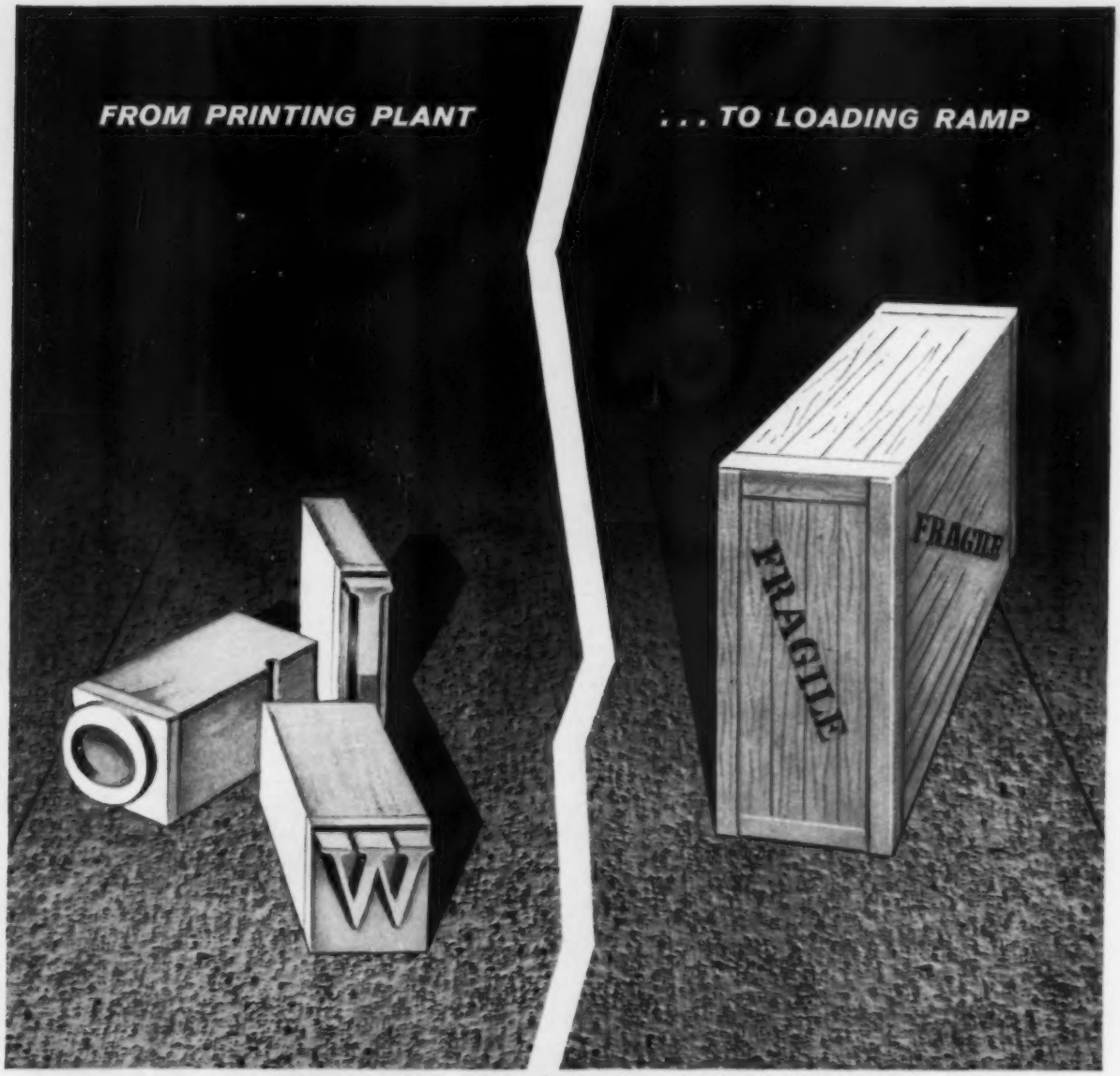
Minus 28% For Semi-Monthly

TOTAL COST @ $1.00 PE

SEE R

HOW DO YOUR COSTS compare with professional elevator maintenance? OTIS can figure your costs accurately. We can tell you why it will pay you to have OTIS keep your freight elevators running like new. We can reduce your shutdown costs. We can eliminate unexpected repair bills. We can hold your costs to one fixed monthly charge. Why not ask your local OTIS man for a FREE Maintenance Survey and Estimate. Then let the figures decide!

Circle 551 on postcard, page 33



Abrasive particles are rolled densely and uniformly into high-quality steel and act as friction grips for safe footing.

There's never a slip on A.W. ALGRIP

(the only ABRASIVE rolled steel floor plate)

Step up your plant safety with Algrip—the world's only abrasive rolled steel floor plate. It provides safer footing where splashing water, grease, oil, ink mist or other slippery substances might otherwise pose serious plant hazards. Even on steeply inclined surfaces, Algrip creates firm traction for workmen's shoes and the wheels of rolling stock.

This high quality steel plate is light enough to use as flooring overlay and is strong enough for independent flooring. Fabrication is simple. You can shear, form, weld and drill it with standard shop equipment. Fire and chemical resistant, Algrip flooring is approved for safety by Underwriters' Laboratories. Write today for Bulletin AL-S4.

ALAN WOOD STEEL COMPANY

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Circle 552 on postcard, circle 33

COURT DECISIONS —a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Engineering License

WHEN SUIT was brought for $4000 for work and material used in the construction of a furnace, the contractors were met with the defense that their activities in this work were engineering services and performed in violation of a law of that state which makes it unlawful to practice engineering without being licensed.

"By the statute," asserted the court in its decision of this lawsuit, "it is made a punishable misdemeanor to 'practice or offer to practice the profession of engineering without being registered or exempt in accordance with the provisions of this chapter.'

"We conclude therefore that a contract for engineering services or an offer to so contract, made by one not duly registered in accordance with the provision of the statute, is void and unenforceable." Court brief 125 So. 2d 268, Ala., Dec. 1, 1960.

Employee's Right to Hearing

WHEN AN employee was accused by his fellow workers of violating company rules in soliciting union membership on company time, he asked to be told the identity of his accusers.

When he received no satisfaction he embodied his demand in a letter to the employer, "This morning I was told by foreman Hawks that two or three employees in the glaze application department were willing to swear that I had solicited them for membership.

"It is obvious that employees have been questioned and urged to make these false statements against me. Therefore not only are these persons lying but they are part of a plan to coerce and intimidate me."

Two days later the employee was told by his foreman, "If you can't tell me who the people were that told you the company was after you it looks like we are going to have to let you go." Refusing to disclose this information, the employee was discharged.

Enforcement of a directive of the National Labor Relations Board was ordered by the federal court. In so doing, the court said, "It is clear beyond dispute that employees have the right to organize for their mutual aid and protection.

"The free exercise of this right by the employee was impaired when he learned from his foreman that employees were swearing that he engaged in activity which could result in his discharge. The employee had the right to request an inquiry to discuss with management the nature of these statements being made against him.

"The Act protects the right of one of the principal proponents of organization to request an investigation where he has been informed that he is being charged with activities which would make him subject to dismissal and which he in good faith believes to be false and that dismissal because of the exercise of that right, violates the National Labor Relations Act." Court brief 282 Fed. 2d 90, August 18, 1960.

Customer Solicitation

AFTER 10 years employment with a dealer in bottled gas, a salesman left that company and accepted a position with a competitor. Many of the customers of this dealer had been acquired by the salesman during his employment. His sales had been made with a customer contract that provided for termination of service by the consumer, "at any time by giving the company 30 days written notice."

No provisions or restrictions against the solicitation of the trade of these customers after the termination of the employment had been made in the contract.

In granting an injunction against the solicitation of any customers of this former employer, who had not terminated their service contracts, the court said,

"In the absence of an express contract not to engage in a competitive pursuit, an employee, upon taking a new employment in a competing business, may solicit for his employer the trade or business of his former customers and will not be enjoined from so doing at the insistance of his former employer, where there is no disclosure or use of trade secrets or confidential information relative to the trade or business in which he has been engaged and which he had secured in the course of his former employment." Court brief 169 N.E. 2d 564, April 16, 1960.

Plastic Wood Formula

AS A CONDITION of his employment, it was stipulated, "It is understood and agreed by and between us that all new and possible patentable matter conceived or developed by us during the said period of your employment pertaining directly or indirectly to the business of the company or to duties performed within your employment, is to be the property of the company."

In addition the employee agreed further, "It is understood as a necessary result of the foregoing that any and all such conceptions and developments are to be considered and kept as secrets."

On leaving this employment 10 years later, this employee organized a company for the manufacture of a similar product. In denying the former employer an injunction against the activities of this new company and the use of the plastic wood by this former employee and his associates, the Oregon court said,

"Oregon has adopted the rule that recovery for infringement on or violation of a trade secret, if any, is based upon a violation of a confidential relationship and breach of trust rather than the theory that the employer might have a property right to the trade secret."

The Oregon court added, "The employee had not made a non-competitive agreement with the employer and was entitled to use any skill and general knowledge acquired in this employment or otherwise even though it was used in competition with his employer, so long as trade secrets were not used nor revealed." Court brief 356 Pac. 2d 84, Ore., October 12, 1960.

Secondary Meaning of Trade-Marks

APPLICATION BY a steel company for registration of trade-marks, consisting of numbers and letters, was denied by the Commissioner of Patents and suit subsequently brought by the manufacturer to compel registration.

Grounds on which these applications were denied by the Commissioner were that the marks were descriptive, meaning "precipitation hardening" and the figures signified the proportions of the constituents of the alloys.

When the federal court directed the registration of these letters and numbers as trade-marks, it said, "A trademark is an arbitrary symbol, word or phrase that is devised and used by a manufacturer or a dealer to designate his goods and that it is understood by the consuming public as identifying these particular products and as distinguishing them from other commodities of a similar kind." Court brief 188 F.S. 554, November 14, 1960.

Just 5 of many ways

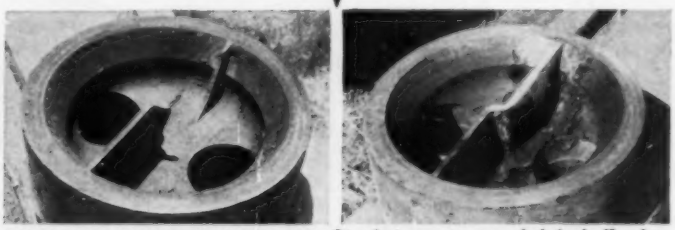
EPOXIES CUT MAINTENANCE TIME AND COSTS

RUSTED VACUUM LINE REPAIRED WITH EPOXY; SAVES $3,400! Rather than replacing this rusted, pitted 10-inch vacuum line, repairs were made with BAKELITE epoxy resin and glass cloth. Despite 2 years of exposure to a chemically corrosive atmosphere, the "new" pipe is still vacuum-tight.

EPOXY GROUTING WITHSTANDS TREMENDOUS COMPRESSOR VIBRATION! Subjected to pounding vibration for more than 4 years, BAKELITE epoxy-based grouts show no sign of failure. Epoxies are a "natural" for this job because they offer high strength, low shrinkage, resistance to grease and oils, and rapid curing.

SURE FOOTING—WET OR DRY! A sand-filled epoxy mixture was troweled onto this railroad siding ramp at ¼" thickness. One year later, the non-slip surface is still like new. Compounds based on BAKELITE liquid epoxy resins can be brushed or sprayed, too.

VALVE CRACK PATCHED FOR $64! This 24-inch valve cracked when it was tested under pressure. Cause: improper tightening of flange bolts. Replacement and labor would have cost $1600. But the crack was quickly patched with only $64 worth of BAKELITE epoxy and glass cloth—and no down time. After 2 years of use, it's still good as new.



BAFFLE PLATE REPAIRED IN HALF A DAY! Circulating water corroded the baffle plate on this heat exchanger (left). Using thixotropic epoxy putty and steel reinforcing, repairs were made in a few hours (right). Alternative method would have put the heat exchanger out of service for 3 or 4 days.

For more information on how you can solve maintenance problems with epoxies, contact your supplier of BAKELITE epoxy compounds. Or write Dept. KE-100K, Union Carbide Plastics Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto 12.

UNION CARBIDE **PLASTICS**

BAKELITE and UNION CARBIDE are registered trade marks of Union Carbide Corporation

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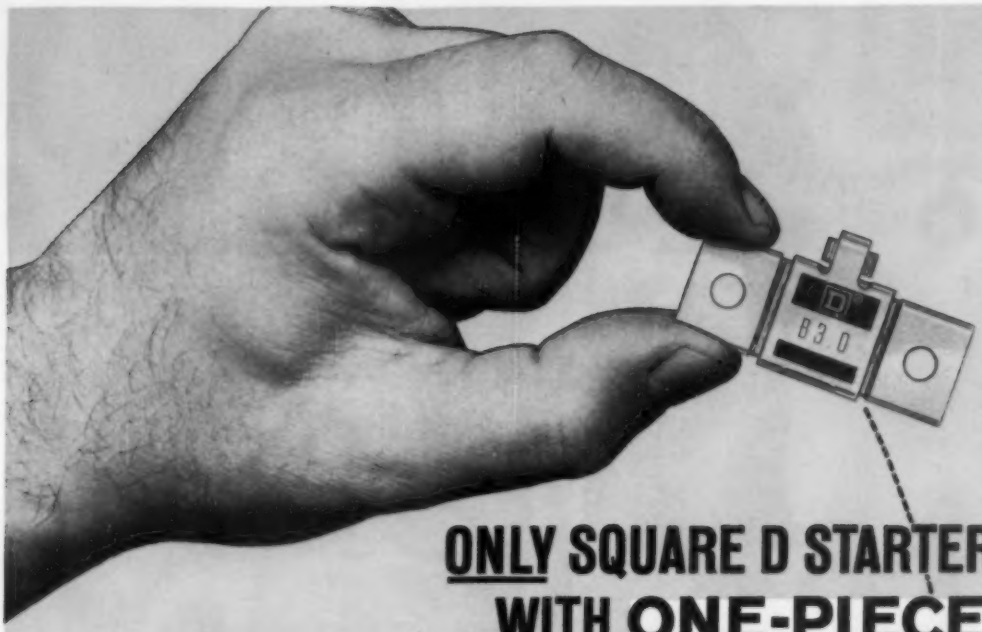
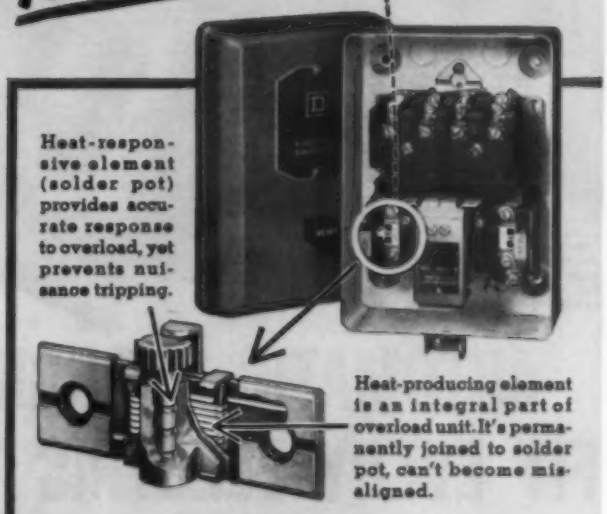


ONLY SQUARE D STARTERS WITH ONE-PIECE OVERLOAD RELAYS GIVE *Absolute* PROTECTION!

• Only Square D makes thermal overload relays with 1-piece construction—and only with 1-piece construction can you *know* you've installed the heater correctly. Square D 1-piece overload relays can be installed only one way. They are factory-assembled, individually tested and calibrated, completely tamper-proof. Repeated tripping will not affect accuracy.

You *pay* for overload protection—be sure you *get* it. Insist on Square D 1-piece overload relays for *absolute* protection.


Heat-responsive element (solder pot) provides accurate response to overload, yet prevents nuisance tripping.
Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.

D EXCLUSIVE— 1-piece Overload Relay for *ABSOLUTE* Protection!

Mail coupon today for simple "jig-saw" demonstrator —see why only Square D gives absolute protection

Square D Company
Department SA-208
4041 North Richards Street
Milwaukee 12, Wisconsin

Please send me information on Square D magnetic starters, along with your simple 3-minute "jig-saw" demonstrator

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wherever electricity is distributed and controlled

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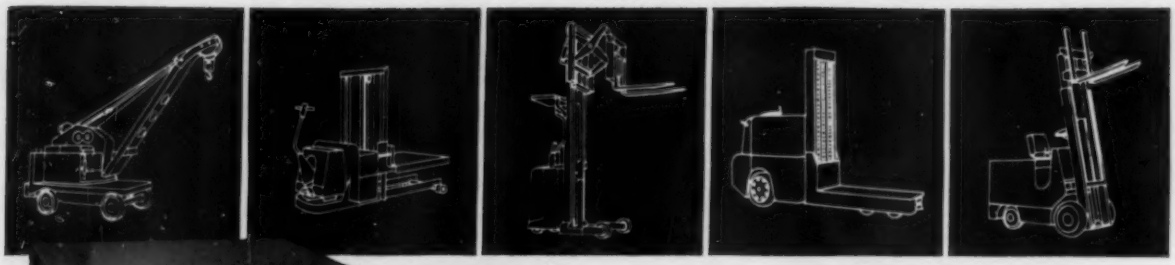
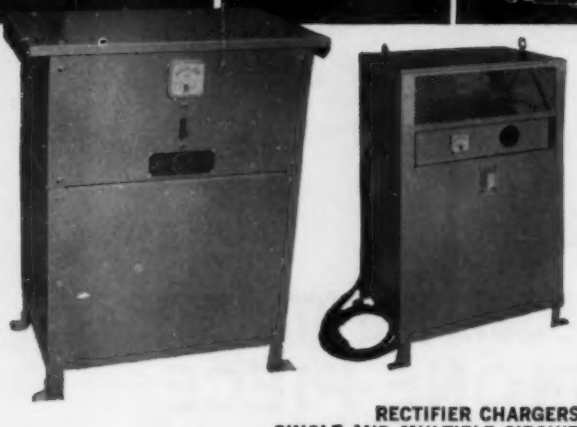




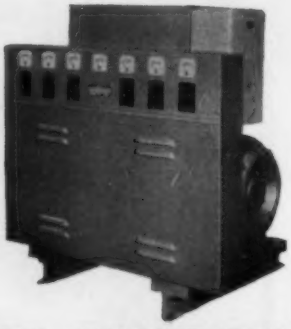
RECTIFIER CHARGERS
SINGLE AND MULTIPLE CIRCUIT

A complete line of fully automatic, magnetic amplifier controlled, solid state rectifiers to fit any industrial truck application.

MOTOR
GENERATOR CHARGERS—SINGLE CIRCUIT

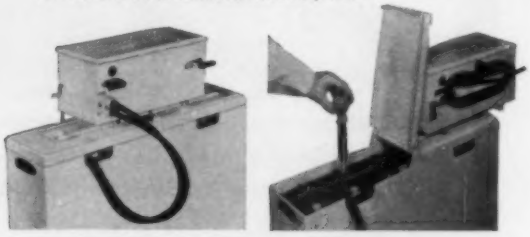
Low speed and noise level motor generator (1750 rpm)

Add flexibility to decentralized charging with these semi-portable, fully automatic models. Transistorized relay gives precise termination of charging cycle. Only AC service entrance connection is required.



MOTOR GENERATOR CHARGERS
PACKAGE MULTIPLE CIRCUIT

These automatic chargers have transistorized relays for exact termination of charging cycle on each battery, shutting the motor generator down when last battery is charged. Only AC service entrance connection is required.



GOULD FULPOWR® UNIT

Fully automatic, complete power package (battery and charger) for hand trucks. Silicon rectifier charger slides to one side for easy battery servicing.

AUTOMATIC CHARGING EQUIPMENT TO FIT EVERY ELECTRIC TRUCK INSTALLATION

Gould now offers charging equipment for every type of installation —plus the facilities to manufacture special chargers of any kind. All units have completely automatic controls for starting and terminating the charging cycle—comply with Industrial Truck Association charging standards. It's the most complete line of charging equipment available to keep your motive power batteries operating at maximum strength.

Gould specification engineers will be happy to assist you in selecting the proper charging equipment for your particular needs, and to help set up battery maintenance procedures. *Ask for our new charging equipment catalog.*

GOULD ELECTRIC TRUCK BATTERIES

A complete line stocked nationwide for fast delivery. Precision engineered to give you sure, positive power.

More Power to you from GOULD®

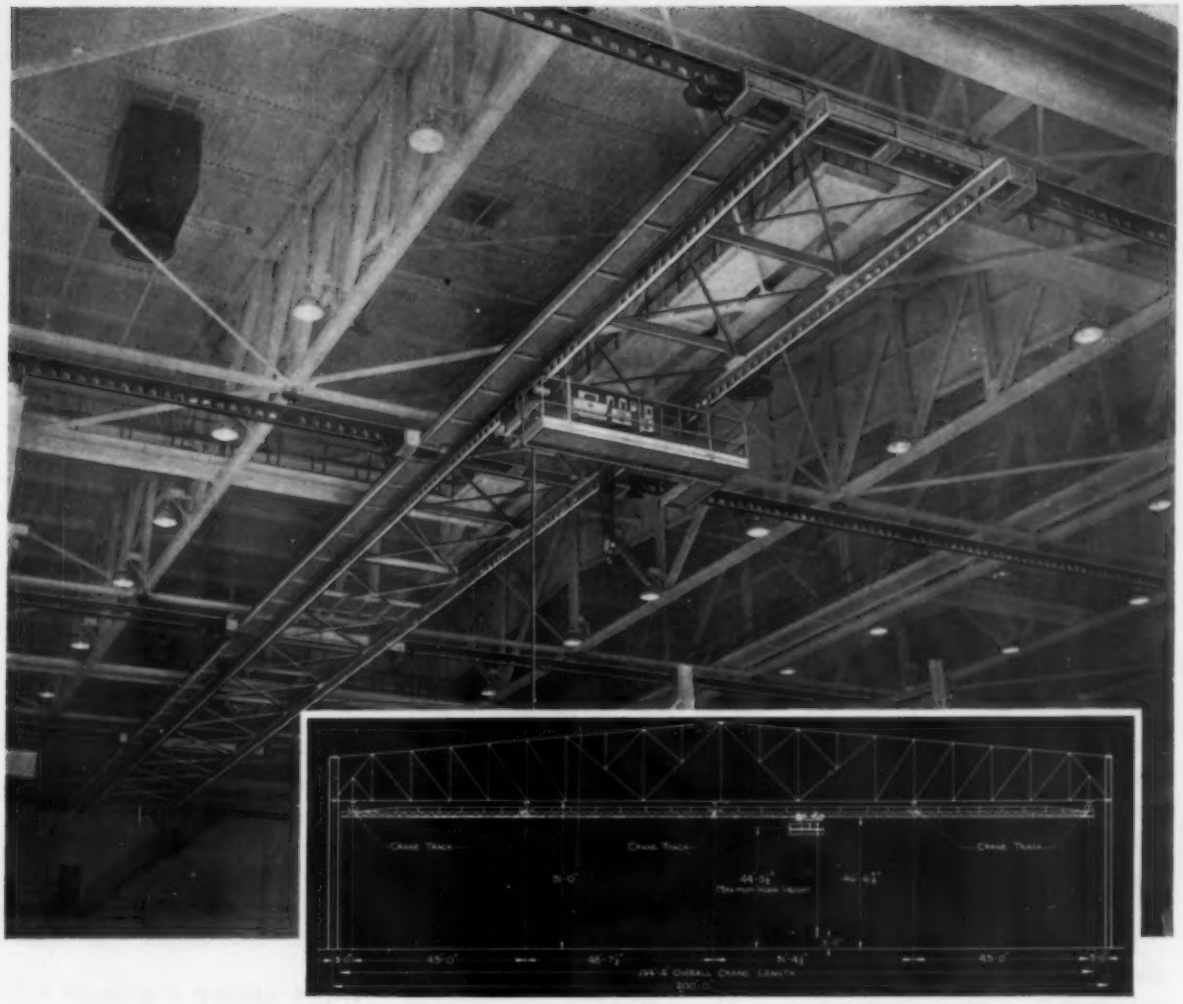
GOULD-NATIONAL GN BATTERIES, INC.

INDUSTRIAL BATTERY DIVISION

GOULD-NATIONAL BATTERIES, INC.

St. Paul 1, Minnesota

Circle 555 on postcard, page 33



ONE OF WORLD'S LONGEST CRANES

194'4" LONG CRANE...Believed to be the world's longest multi-runway crane, this 5-ton, double-girder, 5-runway Cleveland Tramrail Crane is in the Static Flight Test Building of the Lockheed Aircraft Corporation, Burbank, California.

Two-speed bridge drive: 37 and 100 f.p.m. Under test load of seven tons, static deflection measured less than ½ inch at center of 51'-4" span between farthest-spaced runway tracks.

Spell out your crane requirements to a nearby Cleveland Tramrail sales engineer. Whether they call for simple hand propelled cranes or tremendous long-span complex ones, Cleveland Tramrail has had the experience to ably serve you.

WRITE FOR FREE COPY of Engineering and Data Booklet No. 2008. Packed with valuable information. Profusely illustrated.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7563 E. 290 ST. • WICKLIFFE, OHIO

Circle 556 on postcard, page 33

If you have anything to do with plant

take a good look at

Chances are you can get better lubrication... and save money in the bargain

To many people grease is an unglamorous and confusing subject. This is a shame, because grease is really a spectacular sort of lubricant. Nevertheless, people who don't understand it tend to forget it.

As a result, they run into all sorts of trouble. Sometimes they spend too much, buy the wrong thing, or misapply what they do buy. Sometimes they neglect to apply it at all.

True, a few years back, greases could be a headache, principally because in many cases the "right" grease simply didn't exist. To handle some of the tougher jobs grease-makers came up with the weirdest sort of concoctions. No wonder people put grease in the product-to-be-forgotten class.

But times have changed.

Grease-makers have found out a lot. They're making *better* products . . . and Sun's among the leaders in producing a full line of modern maintenance greases.

WHAT IS A GREASE?

It always pays to be sure you know what you're talking about. At least, asking such an academic question may bring to light some worthwhile points you've forgotten. Simply, a grease is a thickened oil. By his choice of thickener, a grease-maker can make a grease with high resistance to water, to high temperatures, or to both. By using additives and inhibitors he can get certain special properties, such as tackiness, high resistance to deterioration, and so on.

You might think of the thickener as a sponge that sops up oil, thus providing a means of keeping an oil *on the job*.

Greases come into their own wherever it's hard to keep oil where it belongs, or where it's impracticable to keep replacing oil that runs away.

You can't make a good grease with crankcase drainings. You must *start* with a very carefully chosen high-quality oil. The better oil makes the better grease.

WHAT MAINTENANCE GREASES ARE AVAILABLE?

There are several principal types: The work horses, made with calcium and sodium soaps, and the glamour greases, usually made with lithium soaps, and sometimes with other soaps or other kinds of thickeners.

Most greases come in several consistencies, or "thicknesses". How they stack up is best explained in the simple chart below.

WHAT ABOUT A SINGLE MULTIPURPOSE GREASE?

Despite what you may have been told, there is no such product. That is, there is no *single* consistency of a *single* type of grease that can handle *every* operating condition. This is the unvarnished truth.

		Handle Water?	OK For High Temperatures?	What Speeds & Loads?	Relative Cost
THE WORK HORSES	Calcium Soap Grease	YES	NO	ANY	LOW
	Sodium Soap Grease	NO	YES	ANY	LOW
THE GLAMOUR GREASES	Lithium Soap Greases & Others	YES	YES	ANY	HIGH

lubrication . . .

what's happened to grease

HOW TO MAKE UP YOUR OWN MIND

You're in luck here. Modern greasemakers are just as eager as you are to cash in on simplicity. So they're cutting down the number of greases they offer, and this makes grease selection simpler for you.

You can start yourself on the way to grease modernization by asking yourself just a few easy questions:

What do I want the most?

- Good lubrication?
- The economy of simplification?
- The economy of low initial costs?
- Or some combination of these?

Of course you want good lubrication. And this is *always* available, because today, somebody, somewhere, has the grease that will stand up to whatever working conditions you've got to handle. The grease you need exists.

So now you're down to the remaining questions: Simplification? Low initial cost? Or a combination? The chart at the bottom of this page tells the story.

HOW MUCH SIMPLIFICATION?

Sometimes you can simplify yourself into spending *more* money, not less. Just the same, most people buy too many greases.

Many plants can do quite well with a single maintenance grease. This is hard for many people to believe. But it can be done, economically, in an amazing number of plants. Yours may be one of these. Many plants, of course, need two or three greases, but rarely any more.

When you're simplifying, the trick's in knowing when to stop.

THE VITAL LAST STEP

Now . . . you need to go only one step farther: You need to find *products* that will handle *your* needs.

And you need *savvy*, to analyze your needs, to pick the best product mix, and to apply wisely the products you buy.

Again the answer's simple. Sun has the *products* and the *savvy*. If you're really interested in getting the most out of grease, your Sun man can help you. Call him. Put the challenge to him. Call him today and tell him that you want to talk grease.

TECHNICAL BULLETIN

If you're not disposed to talk, then you should ask for Sun's new Technical Bulletin 69. It gives complete information on all of the basic types of maintenance greases in a comprehensive, orderly fashion, and lists full details on the major greases Sun makes.

For your copy write to:

SUN OIL COMPANY, Dept. PY-11, 1608 WALNUT STREET, PHILADELPHIA 3, PENNSYLVANIA.

In Canada: Sun Oil Company Limited, Toronto and Montreal. Or call the Sun representative located nearest you.

	Relative Grease Costs	Storage & Handling Costs	Chances of Failure Through Misapplication	REMARKS
Simplification?	HIGH	LOW	LOWEST	Usually, you'll need a glamour grease or two, and this will increase grease costs. This is not necessarily true in plants with narrow ranges of operating conditions or where you don't **need** one grease to handle, for example, high temperatures **and** water. In these cases you can often achieve simplicity by using one or two modern calcium or sodium greases in place of half a dozen.
Low initial costs?	LOW	HIGH	HIGHEST	When you have no condition that **requires** glamour greases, you can use moderate-cost calcium and sodium greases. This keeps grease costs down, but they can be overbalanced by higher storage and handling costs. Failures from misapplication are also more likely.
Combination of simplification and low initial cost?	MODERATE	MODERATE	MODERATE	Just about always the best solution. The bigger the plant, the more varied the needs, the more important a compromise becomes. Of the three, this is the hardest course to chart; to follow it wisely, expert advice is a must.

Circle 557 on postcard, page 33

CAN YOU MEASURE MORALE?

Employee morale—its effect on workmanship and production—can be measured in dollars and cents on your balance sheet. And dust is a silent thief of morale wherever it causes undesirable working conditions. But Pangborn Dust Control Equipment keeps employee morale and efficiency high.

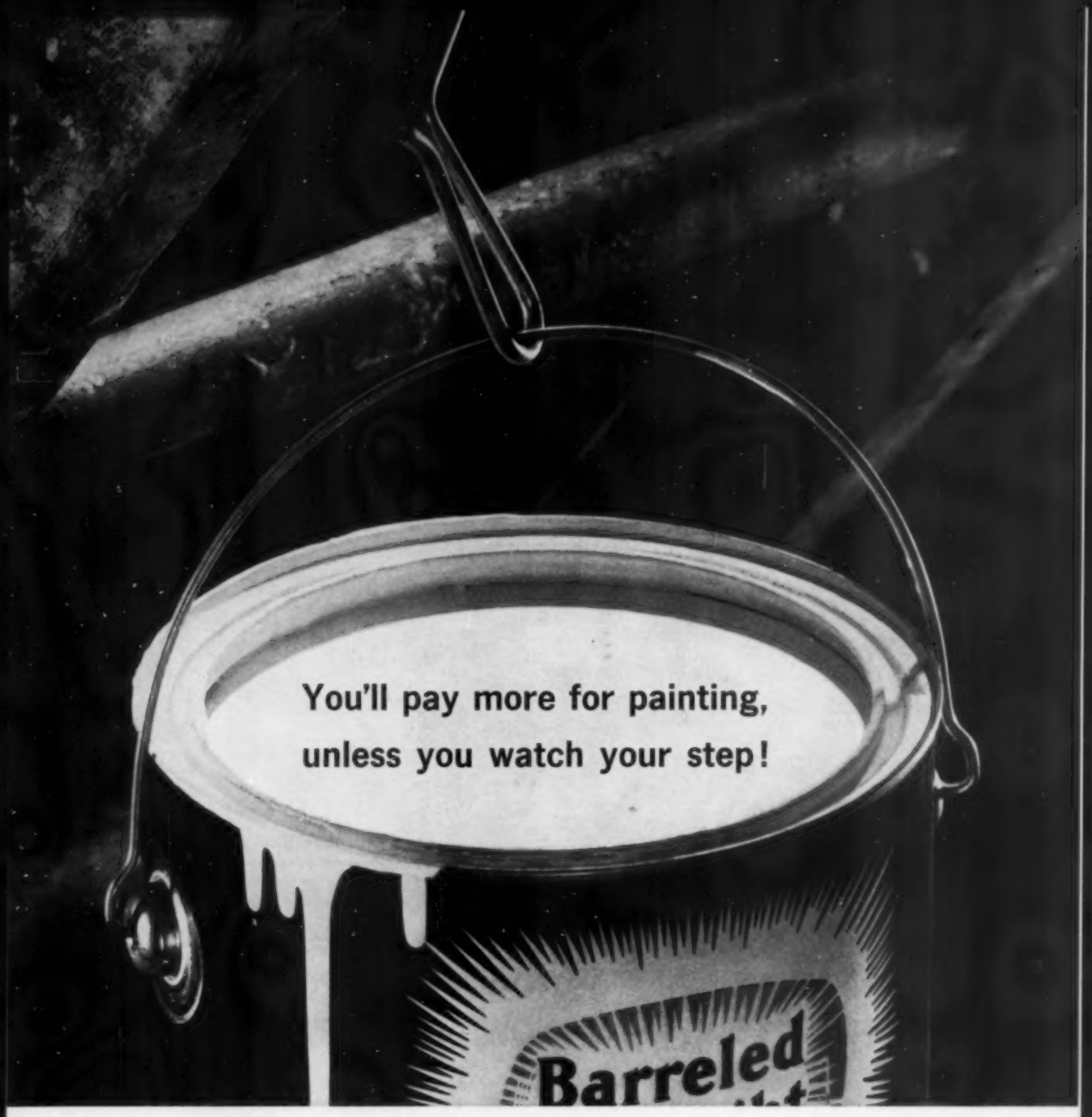
Pangborn Dust Control Equipment gives you more than added efficiency. Removing abrasive or corrosive dust extends machinery life, eliminates health hazards, cuts housekeeping costs, builds better community relations. And reclaimed dust can be as valuable to you as money in the bank.

Pangborn makes Dust Control Equipment for your every need: Cloth Bag, Tube, and Screen Collectors in Self-Cleaning and Unit Types, also Wet Collectors in all sizes. For more information, write:

Pangborn Corporation, 3200 Pangborn Blvd., Hagerstown, Md.; Pangborn Canada Ltd., 47 Shaft Rd., Toronto (Rexdale), Canada; or phone district office in Yellow Pages, "Dust Collecting Systems."
Manufacturers of Dust and Fume Control Equipment; Blast Cleaning, Vibratory Finishing; Rotoblast® Steel Shot and Grit®.

Pangborn
OF HAGERSTOWN

Circle 558 on postcard, page 33



(Climbing labor costs make it imperative you pick your paint with care.)

Field reports from Barreled Sunlight Paint representatives show labor costs eating up *80¢ of every painting dollar*. At this rate, you can see why it's important to pick paints that go on faster, easier. (The superior "hiding" and spreading capacity of Barreled Sunlight Engineered Paints pay off in labor savings up to 20%!) ▾ ▾ You can also see why it makes good sense to purchase paints that last longer . . . the fewer repaints, the lower your labor *and* material costs. This you can be sure of with Barreled Sunlight Paints. Because they're engineered to resist wear, weather and washing, Barreled Sunlight Paints hold their color, finish and "newly painted" look as much as 50% longer than other paints. ▾ ▾ See for yourself. Call in the man from Barreled Sunlight for a free "On-The-Wall" Demonstration. Write Barreled Sunlight Paint Company, 125-K Georgia Avenue, Providence 5, Rhode Island.

2 FREE GUIDES

The famed Barreled Sunlight **"Quick Reference Guide"** to more than 50 Engineered Paints, Primers and Undercoats plus a 10-page booklet on **"How To Reduce Painting Costs."** Write for them.

Barreled Sunlight

ENGINEERED *Paints*

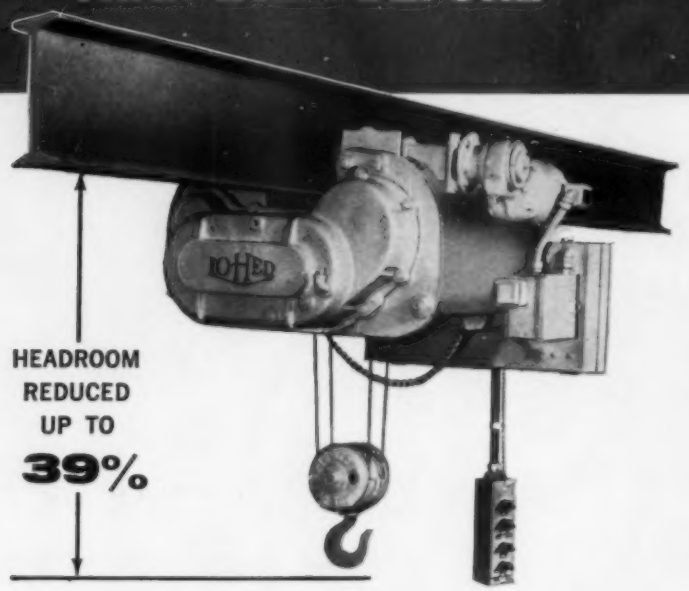
For a Better Looking, Longer Lasting Paint Job at Lower Cost

Circle 559 on postcard, page 33

NEW!

LO-HED HOISTS GIVE YOU MORE WORKROOM THAN EVER BEFORE

Lo-Hed Hoists, which for over 40 years have featured the lowest headroom in the industry, now reduce headroom even more with a remarkable new design by AE Industrial Division's engineering team. This great new increase in workroom is available in Lo-Hed's plain, hand-geared and motor driven trolley hoists.



			DC POWERED	AC POWERED
3 TON	6" less	NOW →	16"	13"
5 TON	8½" less	NOW →	19½"	16½"
6 TON	8½" less	NOW →	20½"	17½"
10 TON	15½" less	NOW →	27½".	24½"

This improved headroom is available with no reduction in other LO-HED plus qualities which give you long, trouble-free service.

HIGH SAFETY FACTOR • STEEL TROLLEYS • CAST STEEL DRIVE WHEELS • TAPER ROLLER BEARINGS
STRAIGHT LINE SPUR GEAR DRIVE • AUTOMATIC HOLDING & LOWERING BRAKE

Representatives in all principal cities

Call our representative in your area for information on: "How to select the proper hoist to meet your needs" and "Five things to consider before you buy that hoist."

AE INDUSTRIAL DIVISION

AIRCRAFT ARMAMENTS, INC.
Post Office Box 6853, Baltimore 4, Maryland

CLEVELAND DISTRICT: A. E. Company, 1157 Leader Bldg., Cleveland 14, Ohio

N. Y. DISTRICT: AE Industrial Division, 1 Exchange Place, Jersey City 2, N. J.

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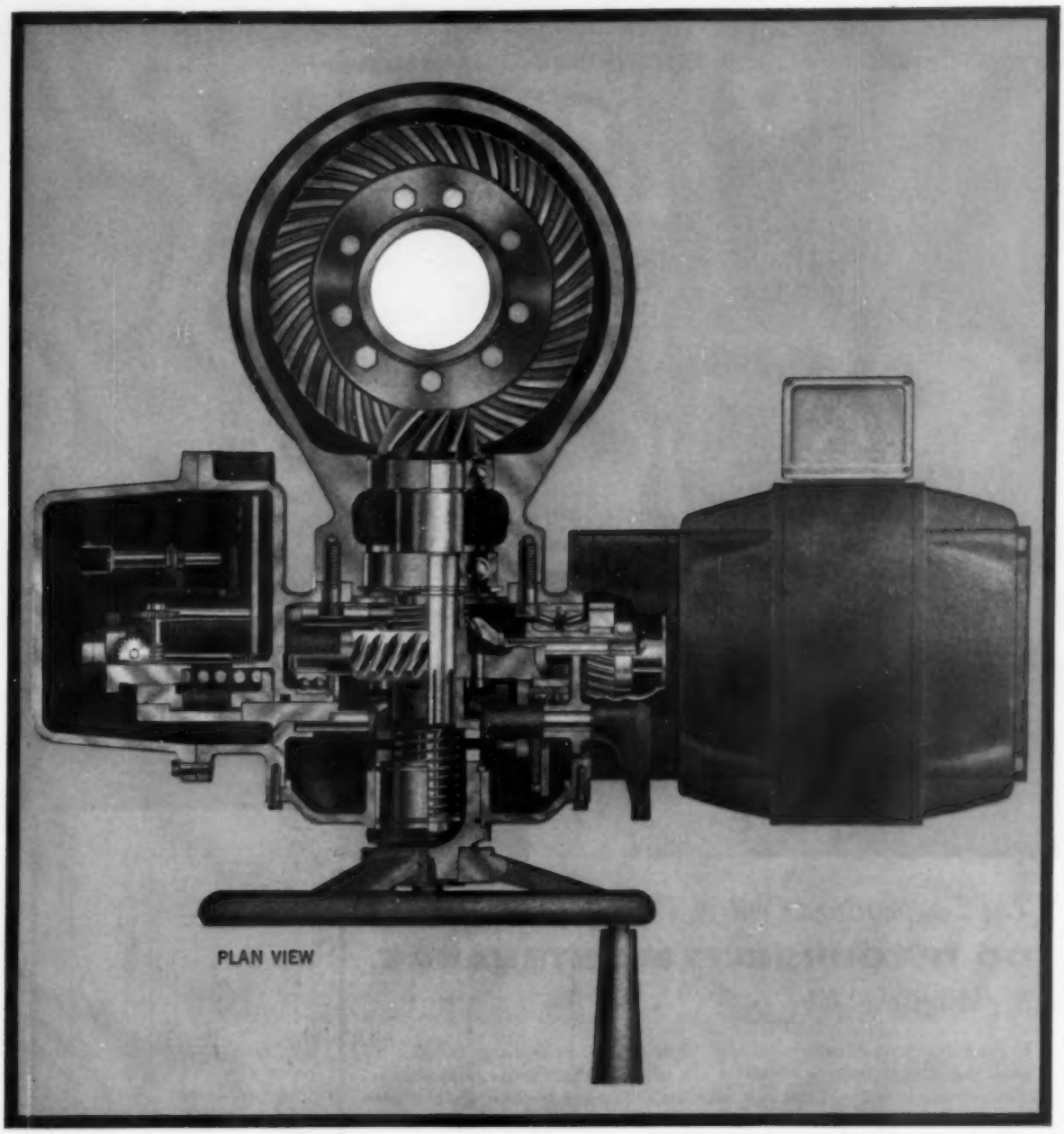


Now–"Crane Teledyne" motor operator for valves

It's new and only from Crane!

Today Crane is the only full line valve manufacturer that offers its own motor operator; this simplifies and speeds up your ordering and installation. And you get undivided responsibility for performance from one manufacturer.

"Crane Teledyne" was designed to provide torque only (thrust is taken on valve parts). This feature results in lower cost, smaller size and less weight than other operators with comparable output ratings.

We specifically designed "Crane Teledyne" for a wide variety of Crane valves. You can order it in two ways: as a conversion kit to motorize present valves in minutes; or fully motorized Crane valves straight from stock.

The motor operator is equipped to act as a gear-operated valve (4:1 ratio) in case of electrical emergencies. Available with push-button control or can be programmed for automated operation.

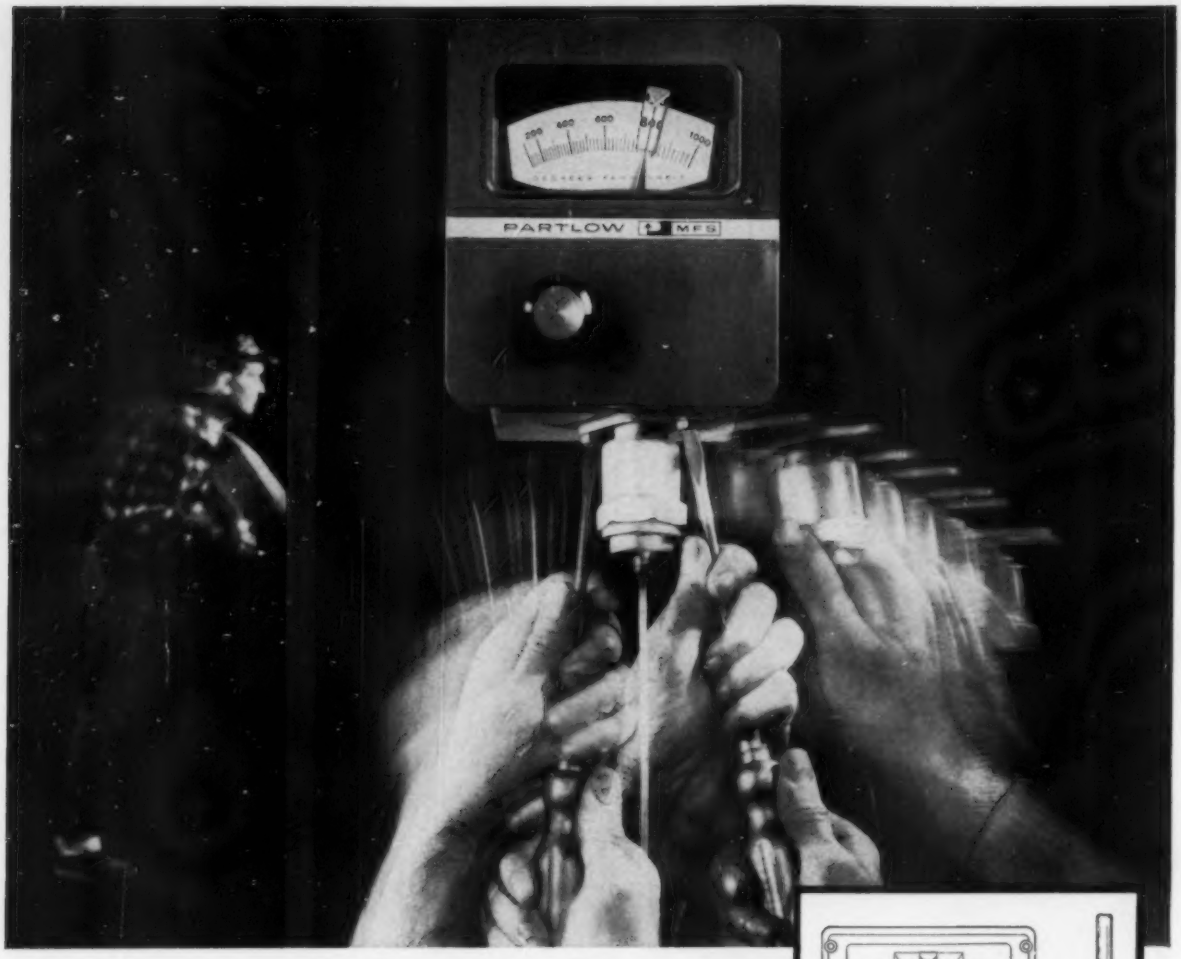
For full information, call your Crane distributor. Or write Crane Co., Industrial Products Group, Dept. C, 4100 So. Kedzie Ave., Chicago 32, Ill. In Canada: Crane Ltd., 1170 Beaver Hall Square, Montreal, Que.

Circle 561 on postcard, page 33

AT THE
HEART
OF HOME AND
INDUSTRY

CRANE

VALVES • PIPING • PUMPS
PLUMBING • HEATING • AIR CONDITIONING
WATER TREATMENT
ELECTRONIC CONTROLS • FITTINGS



The Temperature Control Designed for Fast

"DO IT YOURSELF" MAINTENANCE

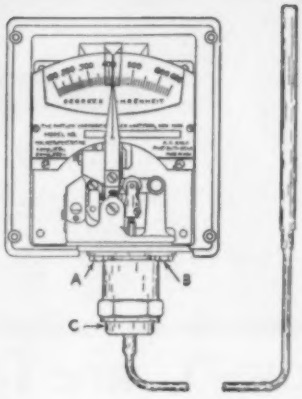
Right on the Job!

Rugged simplicity of design—along with the direct, positive power of mercury-actuation — combine to give Partlow maintenance and performance advantages no other type of temperature control can hope to equal.

Simplicity in the Partlow, for one thing, means that the control element can be changed *at the job site* in a matter of minutes with no other tool than a screwdriver . . . "Down time" is cut to an absolute minimum!

And simplicity in the Partlow also means the complete elimination of fussy electronic gadgets, delicate levers, hairsprings and other accessories that have a tendency to break down at the first trace of jar or jostle. Partlow controls are famous for their unfailingly accurate performance even under the most adverse operating conditions.

If you use or manufacture process equipment within the -30° to 1100° F. range, there's a Partlow pneumatic, electric or self-contained gas control (recording, indicating or non-indicating), to fit your application *precisely*. For details, write The Partlow Corp., New Hartford, New York. Dept. PE-1161.



Diagrammatic view of the new MFS reveals "quick-change" feature common to all Partlow controls. In case of damage, merely unscrew at points (A) and (B), and remove element (C) from case. Reverse this process, and your Partlow is ready to resume operation.

You can pay more but you can't buy better than

PARTLOW

TEMPERATURE CONTROLS

Export Ad. Auriema, Inc.,
85 Broad St., New York 4, N. Y.

Circle 562 on postcard, page 33

THE HORSE TAKES ITS PROPER PLACE

In 1962, one of our favorite annual affairs will be rechristened the "Plant Engineering and Maintenance Show and Conference." PLANT ENGINEERING magazine wants to congratulate Clapp & Poliak for this decision. This action on the part of the Show's management demonstrates the ability and willingness of this most successful organization to get the horse in front of the cart.

Logic, history, practicality, and company structure, in 90 out of 100 cases, places the maintenance function in the plant engineering department. This makes sense. He who designs it, constructs it and equips it is in a strategic position to maintain it.

Practically every printed authority—AIPE's "Code of the Plant Engineer", William Staniar's "Plant Engineering Handbook", and the Government's "Dictionary of Occupational Titles"—says so, too. For example, the Dictionary states, in part, "Plant Engineer. Directs, through subordinate technicians and supervisors, the design, construction and maintenance of equipment and machinery in an industrial plant. Establishes standards and policies for . . . maintenance of equipment in accordance with engineering principles and safety regulations. Coordinates . . . maintenance schedules with operating requirements." That, to use the equine parallel again, is right from the horse's mouth.

A quick review of the listed product classifications at the next Show indicates equipment will be shown that, in 50 per cent of the cases, had to first be engineered into the plant before it could be maintained. Take communication equipment as a case in point. Intense study of many products precedes its final selection and correlation into an efficient system. Then the installation must be engineered to fit into existing sound levels, population, layout and size of plant. Then, and only then, is it available to be maintained.

This change in the name of the Show implies a change in the character and scope of the Conference. With the emphasis—or at least the top billing being given to the engineering phase of the plant engineer's job—it is logical to assume that papers presented at the Conference will also treat the engineering problems of the plant and the design of its facilities. We hope, and trust, that such will be the case.

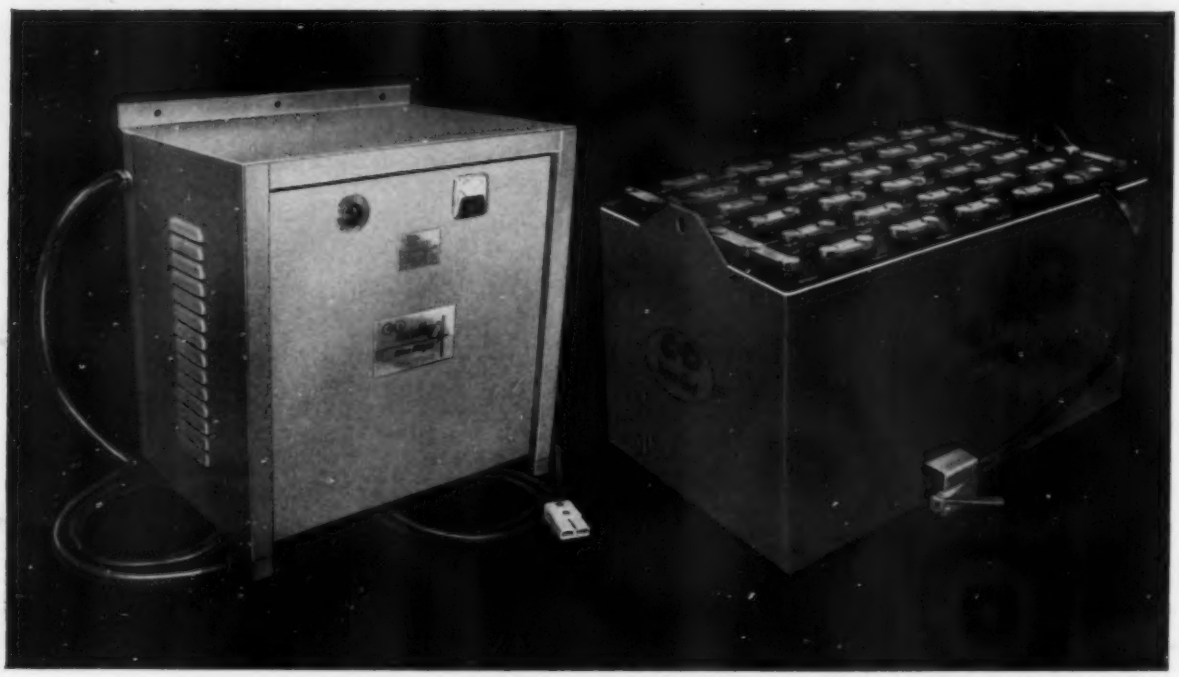
Again, Mr. Poliak, we thank you.

Tom Hanson

ANNOUNCING OPERATION 90

NEW PROGRAM FEATURING BATTERY-CHARGER COMBINATION ASSURES MINIMUM BATTERY COSTS FOR 90 MONTHS

FROM C&D!



Now, with C & D's Operation 90, you get a written warranty for your C & D battery and *AutoReg* charger.

The battery is C & D's *Slyver-Clad*® with *Hi-Impac** cell covers and containers. *Slyver-Clad* Five-Fold insulation and retention virtually eliminates shedding as a determining factor in battery life. *Hi-Impac* cell containers and covers, made of a unique shock-resistant material capable of withstanding a minimum impact of 150 inch-pounds, are practically unbreakable. Thus C & D's warranty provides for their replacement free of charge during the life of the battery.

The Operation 90 program charger is an *AutoReg*® static rectifier charger that automatically provides the proper charge for the battery. The *AutoReg* is the most modern, efficient charger available and is virtually maintenance free.

In C & D's Operation 90 program, you get single source responsibility for battery, charger, and service.

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C & D BATTERIES
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Manufacturers of Slyver-Clad® Industrial Batteries • PlastiCell® and PlastiCal® Batteries for Communications, Control, and Auxiliary Power • Producers of AutoReg® Silicon Chargers and AutoCal® Charger-Battery Combinations

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Circle 563 on postcard, page 33

WHAT'S JUST AHEAD IN THIS ISSUE

- WHAT ARE THE basic considerations when planning an employees' in-plant feeding facility? Parke, Davis & Company had to consider several factors and their considerations were complicated by the need to use existing areas for the project. How they solved the problem is the subject of the article starting on the next page.

- PROPERLY LAMINATED plastic materials can be counted on to give you good service in containing or handling corrosive materials. There are certain characteristics to watch, however, to be sure you are getting the right plastic for the application in mind. Several informative graphs are also included in the article, starting on page 93, to guide your specification and selection of the correct laminated plastics for your use.

- WHAT CAUSES burned-out motors? Ask the man who services this equipment and he will tell you that 90 per cent of motor failures are traced to four specific areas. What are they? They are dirt, moisture, friction and vibration. That's right—90 per cent. So, if you want to reduce motor burn-outs, check the article on page 102 and make sure your maintenance men see that these four gremlins don't get a strong foothold on your motors.

- WHAT IS A research scientist really like? According to one article, published in PLANT ENGINEERING this year, he is a temperamental dome-head, irascible and petulant. In fact, just a necessary evil. On page 106 you'll find an entirely different opinion voiced by a man whose professional life is now devoted to engineering his company's R & D plant . . . and re-engineering it, and re-engineering it to fit the needs of the scientists. How he handles the problems and what he thinks of his prodigies makes for interesting reading.

- WIRE ROPE provides the muscles to move various types of materials in industrial plants, and because of this it is important that the proper size rope is used for the weight involved. To assist you in getting full use from wire rope in your plant, the author lists 14 points to check when inspecting rope. For full details of this helpful information and other tips on wire rope care, turn to page 114.

- WASTE TREATMENT problems increased for Flexonics with their consolidation of six moderate-size plants into one new plant. Because they are located in a small community it was imperative that waste water be of good quality. To attain this, they installed a compact waste treatment system, incorporating two filters. For a description of this system, see page 121.

- NEED ANOTHER boiler? Why not do what Monsanto is doing. Instead of going to all the expense of arranging to have another unit installed at the plant, they merely shuttle portable boilers from plant to plant to take care of peak periods. In fact, they now have a number of boilers on such a service. See page 124 for the complete story.

IN-PLANT FEEDING

Parke, Davis' Facilities Combine Imagination, Good Taste

By H. W. GRUBB, Manager, Construction Engineering, Parke, Davis & Company, Detroit, Michigan

IN-PLANT FEEDING of employees is an important activity for most large industrial organizations. The lack of adequate outside restaurants and the short time available for lunch usually requires that some lunchroom facility be provided inside the plant.

Parke, Davis and Company has recently completed two new in-plant dining rooms. A new employee cafeteria replaced an existing facility which had been constructed in 1929 in one of the older buildings. The second new facility, an executive dining room, intended to serve also as a conference room, was a new venture for this company.

The old employees' cafeteria had become too small for the number of persons to be served and was far behind the modern trend for such facilities. The kitchen was crowded and difficult to keep clean. Storage space was inadequate and remotely located. There were only two serving lines, resulting in long waiting for service.

Recognizing the deficiencies of the existing facility, management agreed that an improved employees cafeteria was needed. At the same time, plans were made for the construction of an executive dining room as part of the cafeteria. Subsequently, as the cafeteria plans developed, another project for the remodeling of the administration building came under consideration and it was decided to locate the executive dining room in the administration building.

During the planning of the cafeteria, we visited a number of industrial dining facilities. Features of each were examined and studied in relation to our project and the space which had been selected. The old cafeteria was serving about 1200 persons at the lunch period and a larger number was expected to patronize the new facility. As the plan took form, it was tested against criteria which the new facility had to meet.

1. The space must be adequate and in a convenient location.
2. Sufficient room had to be available for an efficient kitchen, storage room, and refrigerators.
3. The architectural treatment and decoration had to be bright, cheerful and relaxing.
4. Music, comfortable furniture, low contrast lighting, acoustical treatment, and air conditioning were considered essential.
5. The layout should promote rapid service and a smooth flow of traffic through the serving area.
6. Natural light and an attractive view outside the dining area were desired.

Initially, some consideration had been given to the renovation of the existing cafeteria. However, after making cost estimates for improvements which could be made and after comparing the result with the criteria, it was realized that a satisfactory de-

Top photo, facing page: Patrons pass along both sides of counter to get salads, sandwiches, beverages, desserts. Photo, left: General view shows "blue" area in foreground, "yellow" area in the rear. Serving area is beyond paneled wall at far end.

sign could not be developed in the old area. Recommendations were then made that a new facility be built in a new location.

The location ultimately selected is on the second floor of the main manufacturing building and is accessible by inside routes to most company personnel. Our Detroit plant consists of a large number of buildings constructed over a long period of time. Many of these buildings are separate structures, not connected by passageways. Furthermore, several city streets pass through the plant area. Hence, it was impossible to find a location completely convenient to everyone. The area selected is close to the main office building.

A covered, heated passageway connects with the administration building at the second floor level and other inside passageways are available from other parts of the plant. This location is also close to several other plant facilities. Adjacent or nearby on the same floor are the Univac computer installation, the industrial medical department and the visitors lounge. Professional groups visiting the plant go through this area.

Kitchen, storage room and refrigerators cover an area of approximately 3000 sq ft. Equipment in the kitchen is all stainless steel and includes kettles, ranges, ovens, work tables and sinks arranged for efficient operations. Quarry tile is used on the floor and blue glazed ceramic tile on the walls. Lighting fixtures are recessed fluorescent and the ceiling is plastered. A large exhaust hood is located over the ranges and other hot food preparation equipment. This hood is fitted with stainless steel washable filters and with sprinkler protection.

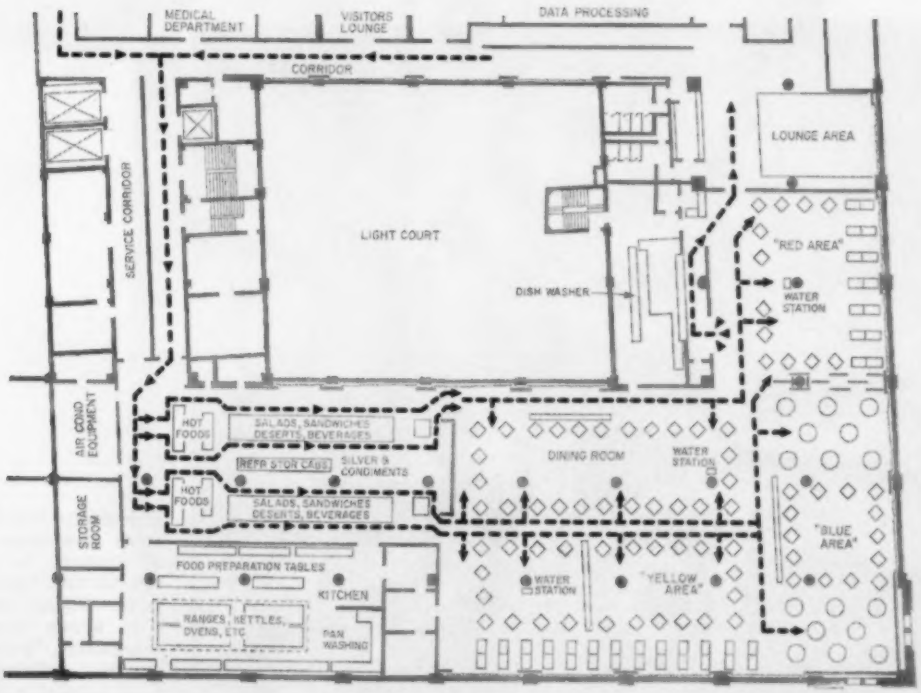
Offices for the cafeteria staff are located at one end of the kitchen and have direct access to the dining room and the kitchens. In the wall between the kitchen and serving area are several pass-through refrigerators where salads and similar dishes are stored until needed on the serving lines. The large refrigerators are of the walk-in type and include a deep freeze room maintained at — 10 F.

Food serving area, located adjacent to the kitchen, is slightly larger. There are two stainless steel serving lines, each shaped somewhat like a "T" with traffic flowing around the top of the "T", where hot foods are served, then down both sides of the stem, where cold foods are dispensed. Hot foods are served by cafeteria personnel as ordered. Cold foods, salads, desserts, sandwiches and beverages are self-served.

Patrons not wanting hot food can bypass the first counter and enter the line at the cold food counter. There are four cashiers. This serving line arrangement makes maximum use of the space, minimizes distances which must be travelled and offers very fast service. The capacity of the serving lines is 20 persons per minute. A half hour lunch period is allowed at Parke, Davis and to meet such a schedule, rapid and efficient service is essential. The lunch period is staggered for various departments over an hour and a half at 10 minute intervals.

Architectural treatment in the serving area includes a suspended acoustical ceiling, incandescent lighting and vinyl asbestos tile floor. Plastic covered panels conceal the building columns. Walls and building columns are covered with vinyl plastic to give

Entrance to serving area is at left, exit is at right. Heavy dashed lines indicate movement through serving area and dining room. Storage rooms and refrigerators are adjacent to the kitchen. Corridors at left of Light Court were formerly one. Wall made one passage available for food movement to kitchen, the other for passage of personnel.



durable and easily cleaned surfaces.

The dining room is the feature of the employees cafeteria. Color, comfortable furniture, and attractive surroundings have been combined to create one of the finest industrial cafeterias in this area. Seating capacity is 768 persons. Most of the tables are square and seat four persons each. In addition, there are round tables seating six, and pairs of rectangular tables arranged to seat groups of eight. The large dining area is divided by planter boxes and a series of painted panels.

A number of architectural changes were made in the dining space. The original industrial steel sash was replaced with aluminum framed picture windows. Cast iron radiation below the windows was left in place and concealed with a white enameled radiator cover, open at the bottom and slotted at the top to permit air circulation. The original design of this building, which is six stories high, inverted the beams at the exterior walls and placed them above the floor instead of below, as is usually done. This resulted in a relatively high window sill. No economical way of reducing the height of the sill was available.

Columns in the exterior wall were covered with wood panels faced with white plastic. These panels were set out from the column so as to form a drapery pocket. Larger wall surfaces were similarly covered with plastic faced panels or natural finished cherry plywood. The round building columns were plastered and covered with vinyl plastic.

Plenum Aids Circulation

Windows on the light court are glazed with unpolished plate glass. The entire cafeteria area is air conditioned. The large open area and the small number of zones in the system made the use of an Aircon ceiling particularly attractive. In this ceiling construction, the space between the ceiling and the floor above is used as a plenum and air enters the conditioned space through slots in the ceiling tile. This gives a very uniform distribution of air and does not require the usual large diffusers in the ceiling. In this case we insulated the structural ceiling to prevent any condensation on the third floor of the building. Duct work for return air is also run through the plenum space.

Note quarry tile floor and large exhaust hood in kitchen near the soup kettles. Pan washing sinks are in background. All equipment, including filters, is stainless steel.

Lighting fixtures with incandescent bulbs were selected to give a low contrast, warm lighting effect that would give food a more appetizing appearance. While the lighting level was generally satisfactory, the initial bulb selection did not give a uniform lighting. Investigation disclosed that the filament was casting a shadow. Changing to a different type of bulb corrected this problem. There are, of course, a large number of fixtures. To minimize the problem of burned out bulbs, high voltage, long life bulbs are used.

Chilled water for the air conditioning system is supplied by an absorption type refrigeration machine located in the basement of the building. This machine uses low pressure steam to regenerate the desiccant and complements the power generation equipment which exhausts steam at a low pressure.

The dishwashing room is located near the exit from the cafeteria. Patrons bus their own dishes, leaving the trays at shelves opening into the dishwashing room. Equipment includes work tables, disposers, and a dishwasher that has a capacity of 5000 pieces per hour. This room has quarry tile floor and glazed ceramic tile walls. The ceiling is plaster, painted white; with recessed fluorescent lighting.

A small candy and tobacco sales counter is located near the door as one leaves the dining room. The cafeteria plan includes a small lounge at the end of the dining area. Music is provided in the dining area by a series of speakers located above the acoustical ceiling.

Furniture in the employees cafeteria is of contemporary design with colored plastic backs and Naugahyde covered upholstered seats. The chairs are arranged in three color groups: yellow, blue and red, and are separated by planter boxes or panels. Dining tables have light gray tops and the planter boxes are white with black iron frames. These colors complement the color selections for the wall panels mentioned earlier. Traverse drapes are installed on all exterior windows. Drapery colors are alternately white and yellow.

Open A.M. through P.M.

The Employees Cafeteria now serves over 4000 persons per day. It is open in the morning prior to eight o'clock for light breakfast service, again at ten o'clock for coffee, and at eleven thirty for lunch. Late in the afternoon it is open for service to personnel on the second shift. At the lunch hour approximately 1650 persons are now served, an increase of about 35 per cent over the old facility.

Opening day for the new cafeteria was disturbing to say the least. A special dinner had been planned at a rather low price, and overwhelming interest resulted in slow service, running out of food, and many persons being late after the lunch hour. Those of us who had been concerned with the planning of the cafeteria had some doubts as to the wisdom of our design. However, the scheduling and planning were soon corrected, problems were resolved, and the rapid service expected was attained.

The cost of the Employees Cafeteria was $495,000. The approximate

breakdown of this total is as follows:

Architectural work, including fees, air conditioning, mechanical and electrical work	$258,000
Kitchen equipment and installation	180,000
Furniture and furnishings	57,000
	$495,000

This is equivalent to $645 per seating place in the dining room.

The executive dining room is the second of the new dining rooms in the Detroit Plant. This room was planned to serve two purposes: 1. a dining room for a limited number of company executives and their guests, and 2. a meeting room for special groups of intermediate size which could not be conveniently accommodated in the auditorium or in other conference rooms. The location selected is on the first floor of the Administration Building, convenient to the offices of the corporation executives and the overseas division which has special need for a meeting room of the type planned.

This executive dining room accommodates 50 persons at lunch and occupies a space of 1500 sq ft. The room has outside exposure on two sides and windows in these walls were replaced with new sash extending to within 14 in. of the floor. One interior wall is plastered and painted white while the other is panelled with zebra wood. In this wall, behind hinged panels, is a blackboard and a movie screen with electrical control for raising and lowering is located in the ceiling. The floor is carpeted and an Aircon ceiling is used in this room.

At the entrance, which is panelled with white plastic covered panels, there is a small lounge separated from the dining area by a gray glass panel. The lounge is furnished with four Barcelona chairs and a square coffee table, all setting on an oriental rug. Dining tables and chairs have an ebony finish. The chairs are Danish modern with black oxhide seats. There is one large round table seating eight persons and seven rectangular tables seating six persons each.

The decor of the executive dining room is quiet and masculine in character. On the inside wall is a small, low cabinet with a white marble top. Above it is hung a Japanese print in a black metal frame. The dark green carpet is complemented by green drapes and white glass curtains. On the walls are colored photographs of scenes from foreign countries where Parke, Davis has plants.

Food is prepared in a small kitchen, completely equipped for the preparation of hot foods as well as salads and other cold dishes. The dining room has an FM tuner and amplifier and can receive any FM broadcast in the area.

The architect for both projects was Horace G. Colwell of Royal Oak, Michigan. Assisting in the selection of interior finishes were Mrs. Florence Knoll, Knoll Planning Unit, New York City and Mrs. Jane Johnson of Skidmore, Owings and Merrill, Chicago. Al Siegel of Detroit was the consultant on the preparation of specifications for kitchen equipment and layout. Both projects were constructed by John Cooley Company, General Contractors, Detroit, Michigan.

Working very closely with Parke, Davis' Construction Engineering department throughout the projects was Paul Baumgardt, Manager of the Cafeteria operation for Parke, Davis & Company. **End**

Above, Right: Patrons leave trays on shelves at right; dishes are scraped clean of loose food at work tables adjacent to shelves. Dishwasher is at left.

Right: This is the lounge area at exit from cafeteria. Section of cafeteria visible in photo is the "red" area. Lounge furniture is tan, blue and red.

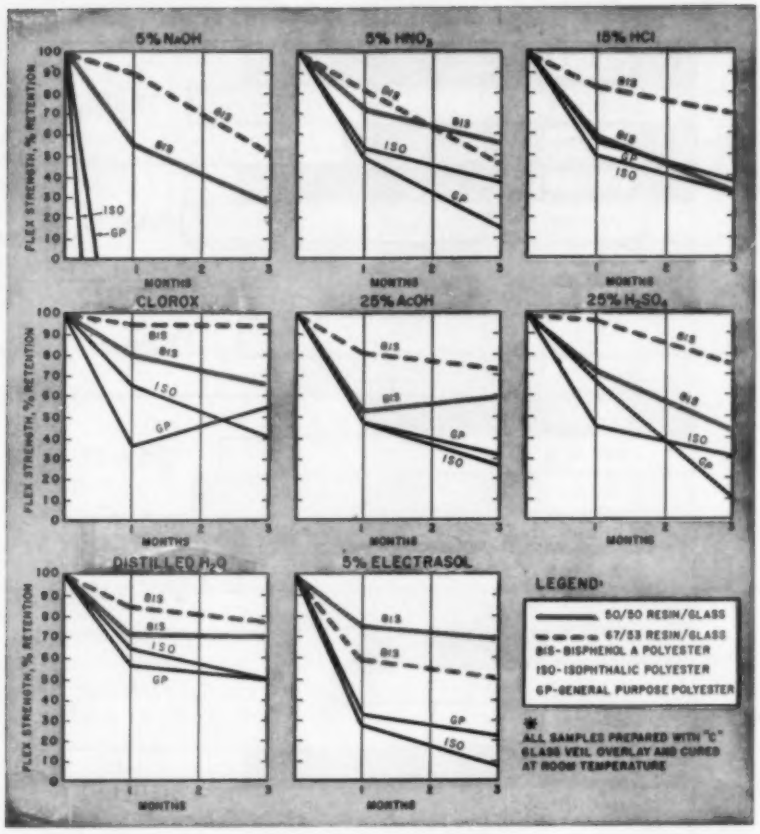


Fig. 1. Graphs show the flexural strength retention of hand layup laminates in corrosive solutions at 210 F.

CONSIDER REINFORCED PLASTIC FOR YOUR CORROSION PROBLEMS

By S. S. FEUER and A. F. TORRES
Atlas Powder Company, Wilmington, Delaware

INDUSTRY is showing a growing interest in reinforced plastic equipment to combat the high cost of corrosion. Plastic materials such as the specialty polyesters will resist many of the corrosive fumes and solutions of acids, alkalies, bleaches, salts, many solvents and plating solutions. Reinforced plastic fabricating lends itself to all shapes and configurations, and the equipment is light in weight, easy to install and requires little or no maintenance.

Length of service life and degree of maintenance required will depend upon three basic factors: (1) type of plastic and reinforcing fibers employed; (2) equipment design; and (3) quality of the fiber-plastic laminate. It is becoming increasingly understood by the plant engineer that selection of the plastic should be based on the specific corrodents and temperatures encountered in the application. The importance of laminate quality, however, has been largely neglected, although this factor is intimately related to equipment performance.

Recent studies have shown that even when the most resistant of polyester resins is used in the manufacture of units such as hoods, tanks, ducts, scrubbers or stacks, improper laminating techniques may cause a premature end to the working life of the equipment. The plant engineer will find it helpful to study comparative tests as an aid both in selecting the proper resin for specific conditions and in avoiding the pitfalls of poor fabrication.

The structure of the laminate (the proportion of resin, type of reinforcing fiber, filler, etc.) plays an im-

portant role in determining corrosion resistance. Tests at Atlas Powder Company show that at the end of three months, laminates made of 67 per cent resin-33 per cent glass, outperformed 50 per cent resin-50 per cent glass samples in most of the corrosive solutions used.

In addition to this good short-term corrosion resistance, the 67 per cent resin test samples show a leveling-off of flexural strength in most of the solutions as illustrated in Fig. 1. This characteristic is of extreme importance because it results in considerably longer service life than the extrapolated short-term data would suggest.

The high chemical resistance of this laminate stems from its higher resin content. Chemical inertness is imparted primarily by the resin. The glass cloth or mat is incorporated basically to add strength to the structure. Glass fiber used in these tests were of the borosilicate type, a chemically resistant type of glass generally used by fabricators of corrosion resistant reinforced plastic equipment.

Corrosion resistance of a reinforced polyester structure is also influenced by the type of fiber in the surfacing mat, as illustrated in Fig. 2. Of the three materials tested, Dacron retained the greatest degree of flexural strength in acid and equaled the performance of glass in alkaline solutions, distilled water, and sodium hypochlorite. Orlon had a lower resistance to both the Dacron and the glass-surface laminate in most of the corrosive solutions. Although not evaluated in this test series, Dynel has been reported to show good results, particularly as a surfacing mat in alkaline solutions.

Also involved were the effects of poor laminate preparation on corrosion resistance. Test samples of reinforced polyester laminate were then made up in a press without the protection of a surfacing mat, a vital component for corrosion resistance. The glass fiber was purposely not wet-out properly with a resin-rich protective surface layer.

The poorly wet-out, unprotected laminates showed markedly inferior corrosion resistance properties in all test solutions. Although the type of polyester resin used exerted an influence on chemical resistance, the test showed that service life of equipment with a poorly laminated structure will be reduced to as little as one-fifth of the expected life.

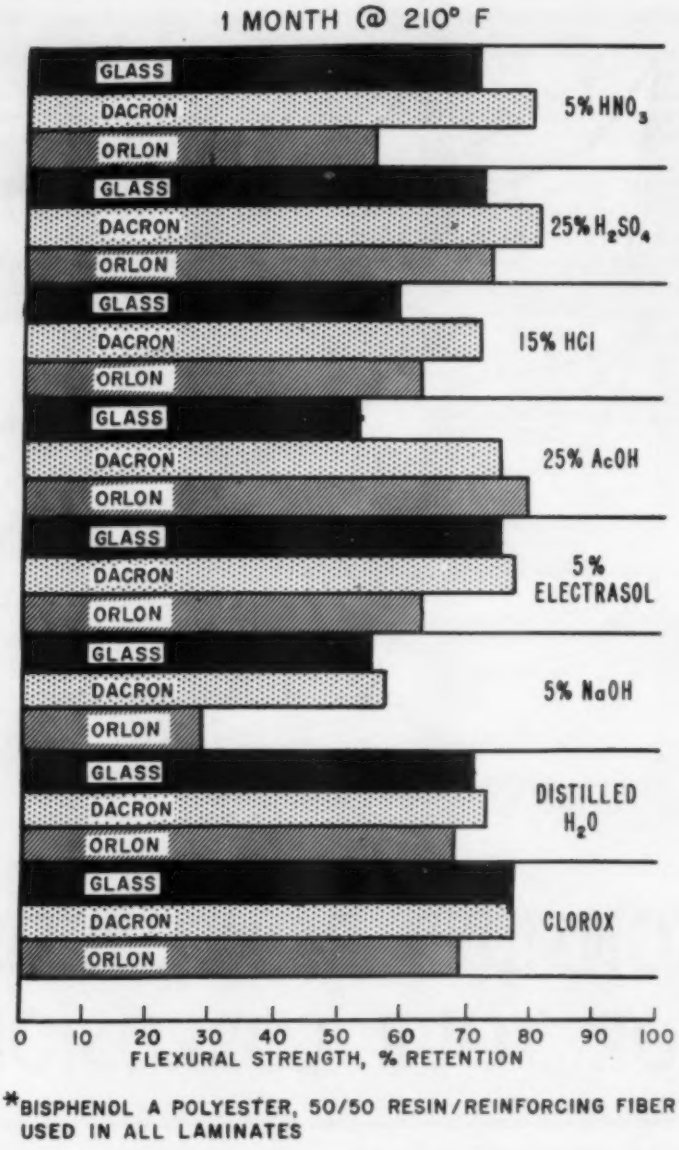


Fig. 2. Graphical comparison of the effects of various surfacing fibers on the corrosion resistance of laminates in eight common solutions is charted above.

The resin-rich layer and surfacing mat is generally followed by two alternate layers of chopped strand borosilicate glass, rather than lime glass, reinforcing mat and resin, as shown in Fig. 3. Specifications should call for a mat weight of at least 1½ oz. The binder in the mat should be resin-soluble to allow the mat to be formed without springback. Specifications should then call for subsequent layers of mat, cloth or woven roving to satisfy weight and strength requirements.

Overlapping areas of mat or cloth require special care to cover each layer with resin individually, and this operation should be covered in the specification. While a poorly constructed overlapping section will weaken the entire structure and diminish corrosion resistance, a proper joint will enhance the working life of the laminate. For cloth or mat, an overlap of at least ½ in. is recommended. Lapped sections of adjacent

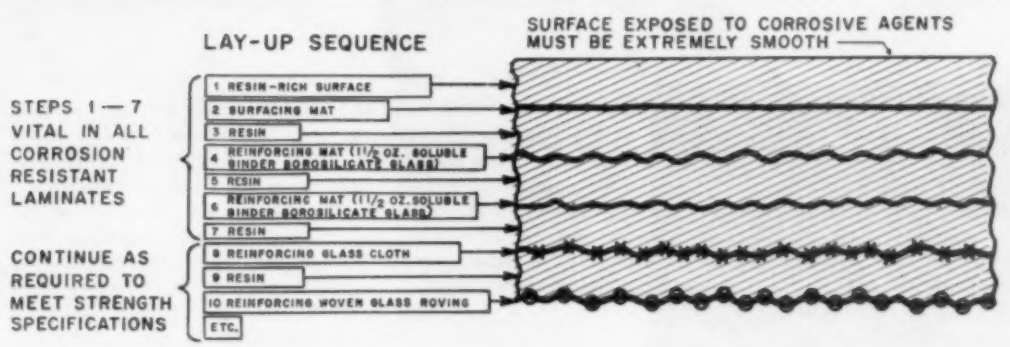

LAY-UP SEQUENCE
SURFACE EXPOSED TO CORROSIVE AGENTS MUST BE EXTREMELY SMOOTH
STEPS 1 — 7 VITAL IN ALL CORROSION RESISTANT LAMINATES
CONTINUE AS REQUIRED TO MEET STRENGTH SPECIFICATIONS
1 RESIN-RICH SURFACE
2 SURFACING MAT
3 RESIN
4 REINFORCING MAT (1½ OZ. SOLUBLE BINDER BOROSILICATE GLASS)
5 RESIN
6 REINFORCING MAT (1½ OZ. SOLUBLE BINDER BOROSILICATE GLASS)
7 RESIN
8 REINFORCING GLASS CLOTH
9 RESIN
10 REINFORCING WOVEN GLASS ROVING
ETC.

Fig. 3. Exaggerated thicknesses of resin layers illustrates the proper laminate lay-up construction for corrosive service.

layers should be staggered for maximum strength.

Visual examination provides one of the most simple and effective ways to judge the soundness of a laminate. Look for uniformity of the laminate to detect air bubbles, dry spots, internal cracking or other conditions indicating possible weaknesses in the structure as shown in Fig. 4.

Check Surface Condition

Surface condition is another indication of laminate construction. A smooth, true surface is generally a sign of a well-made, uniformly-cured laminate. If exposed fibers exist on the surface, there is a rupture in the protective gel coat vital to corrosion-resistance. Exposed fiber bundles also indicate the likelihood that a surfacing mat is absent.

Industrial specifications often call for cutting a section of the fabricated piece (overage of length, manhole, etc.) for testing. The resulting cross section will reveal the depth of the surface layer and shape and conformity of the laminate.

Stressed areas often will be seen immediately in the form of internal cracks. The cross section will also show the bond between layers and degrees of wet-out of the fibers as well as the position of the surfacing mat and the thickness of the protective resin-rich layer.

Another test often used is Barcol hardness. This test is useful only for measuring the relative hardness of pieces fabricated from a single type of resin. Results are meaningless when comparing different resins because each polyester will have its own inherent hardness.

If, however, the Barcol hardness falls short of the average ratings found in well-cured structures of the same resin and construction, the plant engineer should immediately suspect an incomplete cure, and resulting poor corrosion resistance. **End**

Fig. 5. Bulge close to the area where flange is joined to reinforced polyester pipe was caused by "resin sag," which could have been prevented by adding a thixotropic agent to the mix.

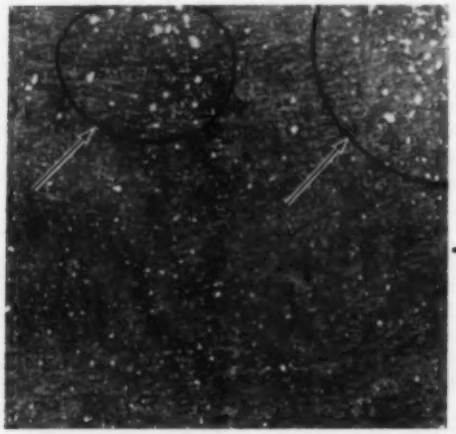


Fig. 4. Excessive air entrapment, a serious defect, was spotted by placing a light bulb behind this section.

SIGHT GLASSES— HOW TO MAINTAIN THEM

Sight glasses should be inspected with a bright light. Any marks in the glass which glisten mean that it should be replaced. Cloudiness on inner surface indicates chemical attack.

SIGHT GLASSES are essential in many chemical and industrial processes where they insure safe visual observation of high temperature and high pressure operations. The glasses are used in ovens, absorption columns, reaction kettles, furnaces, stills, processing tanks and other equipment. Their functions range from the control of critical reactions to the convenience of the operator.

The thousands of pressure windows throughout the country serve as vital tools in modern industrial production. And like any useful tool, the glasses must be properly cared for.

Proper maintenance of sight glasses goes beyond routine "spit and polish" for good plant housekeeping. Obviously for the glasses to function at all, the operator must be able to see through them. If the glass surface is abraded or clouded, vision is appreciably reduced or distorted.

Proper care contributes to the life of the glasses, which, while not made of delicate compositions, are subject to the extremes of pressure and temperature. Perhaps most important, maintenance insures the safety of plant personnel as well as the equipment.

Improper maintenance will reduce the service life built into the glass by the manufacturer, even to the point of causing failure. If the window is used in a volatile process, failure can be dangerous.

Most failures are caused by one of three factors. The first is mechanical surface damage. Essentially, the strength of glass is directly proportional to the condition of its surface. Anything more than superficial surface damage will markedly reduce the strength of the glass.

The second weakening factor is corrosive chemical damage. This, however, is minimal since borosilicate glass is impervious to the attack of chemicals except hydrofluoric acid and hot concentrated phosphoric acid;

sodium and potassium hydroxide above 125 F; and condensing steam and superheated water above 250 F.

Extreme thermal shock is the third factor in failure. Excessive temperature differences between the inside and outside surfaces of the glass create a greater than allowable stress.

Sudden heating or cooling can, temporarily, almost double the normal stress. Rapid heating is less harmful than sudden chilling because heating causes compressive stress while cooling causes tensile stress. (Glass fractures only from tensile stress, never from shear or compression.)

The following procedures will provide proper sight glass maintenance:

Storage—Keep the glasses in the original package until ready for use. All sight glasses are inspected before packaging and many are wrapped individually to protect them from scratching.

Cleaning—Use any standard glass-cleaning solution. A soft drying cloth is recommended. When cleaning the inside of the vessel, do not damage the glass with harsh abrasives, scrapers, air hammers, wire brushes, or similar tools.

This same care—not to bump, chip, bruise or scratch the surface of the glass — should be exercised at all times, during receiving, inspection, storage, pre-installation, installation and use.

Inspection and Replacement—Schedule regular inspections to determine the need for replacement. The frequency of inspection will depend on the type of service, including amount of operation, materials handled, and the hazards involved in failure.

Examine glass with an intense light, such as an automobile stop-light bulb or a projector bulb, for any signs of weakness. These signs will include any marks showing up as glistening lines or marks on or within the glass. If such marks are noticed, replace the glass. Also replace glass which has surface scratches deep enough to catch a fingernail.

The bright light source will also show any tendency for the inner surface to become cloudy, a sign of chemical attack. With annealed glass, the problem of chemical attack is one of obscuring vision rather than weakening the glass (a frosting effect will take place before any appreciable change is made in the glass strength.)

With tempered glass, any clouding on the inside surface means that the glass should be replaced. If there is evidence of actual erosion of the glass surface, institute an accelerated inspection schedule.

The useful life of a sight glass under severe alkali service might be as low as several weeks, while in acid or neutral conditions the life might be infinite. For alkalis, steam or condensate at elevated temperatures, glasses may be protected by a sheet of mica or thin cover glass which can be replaced at low cost.

Tips on Maintenance

Beyond this general procedure, certain points in maintaining sight glasses should be remembered.

• In replacing sight glasses, install the correct glass. When different types of glasses are used, identify

Table compares diameter sizes, pressures for four types of sight glasses.

TYPE	Diameter (inches)	Gasket Rim Width (inches)	Pressure Annealed (lb/sq in.)	Pressure Tempered (lb/sq in.)	Number of Bolts	Bolt Size (inches)	Max. Bolt Torque (lb/ft)*	Bolt Circle (inches)
MOLD FINISH	2½	¼	30					
	3	¼	20					
	3½	¼	15					
	4	¼	10					
	4½	5/16	8					
	5	5/16	6					
	6	3/8	3					
	8	3/8	3					
ANNULAR EDGE	4	½	154	450	6	3/8	8½	4¾
	5	½	100	300	6	3/8	10	5¾
	6	½	60	180	6	½	18	6¾
	6¾	½	45	135	6	½	18	7½
	8⅝	½	30	90	8	½	20	9⅛
PYREX PLATE	4		154	450	6	3/8	8	4¾
	5		100	300	6	3/8	8½	4¾
	6		60	180	6	½	18	6¾
	6¾		45	135	6	½	18	7½
	8⅝		30	90	8	½	20	9⅛
VYCOR PLATE	4		115		6	3/8	8½	4¾
	5		75		6	3/8	8½	4¾
	6		48		6	½	18	6¾
	6¾		33		6	½	18	7½
	8⅝		22		8	½	20	9⅛

*For hard gasket materials. Softer gaskets may seal at lower torque bolts.

them to prevent interchange through error. Install all glasses according to the manufacturers' recommendations. Always be sure that the seat on which the glass will rest is flat and clean (free of all bits and pieces of old gasket material).

- Protect the glasses from the possibility of being struck by falling or moving objects.
- Do not subject hot sight glasses on pressure vessels to blasts of cold air or streams of cold water.
- Replace glasses in vessels that have undergone overpressure tests.
- Set safety devices on vessels at or below the maximum pressure of the sight glasses if it is lower than the design pressure of the vessel itself.
- In case of repeated sight glass failure, check the mounting. If the glass is mounted flush with the vessel, flexing stresses may be the cause of failure. A nozzle-type mounting will relieve these stresses.
- A last and most important maintenance tip is to always select the right sight glass for the right job. One of the leading manufacturers of sight glasses, Corning Glass Works, catalogs four kinds of glasses for different jobs.

Types of Glass

The first two, of Pyrex brand borosilicate glass, are:

1. Mold Finished. Recommended for use where there is low pressure with or without high temperatures.
2. Annular edge, annealed. Recommended for high pressure uses and uses which expose the glass to corrosives.

Annular edge, tempered. Recommended for high pressure uses but not uses which expose the glass to corrosives.

The third and fourth kinds of sight glasses are:

3. Pyrex brand plate glass discs, annealed or tempered. Recommended for non-standard applications and sizes.
4. Vycor brand sight glasses. Recommended for applications where there are extremes of temperature.

Additional details regarding these four types of glass are shown in the table.

Note that the annealed mold finished sight glasses can take the least pressure/sq in., from 30 lb for 2½ in. diameter glass to 3 lb for one 8 in. in diameter. A 4 in. diameter annular edge or Pyrex plate annealed glass withstands pressures of 154 pounds/sq in. A similar size and type tempered glass is recommended for pressures up to 450 pounds/sq in. Annealed Vycor brand plate sight glasses, also 4 in. in diameter, can take 115 pounds pressure/sq in. The maximum permissible pressure decreases in inverse relation to the size of the glass.

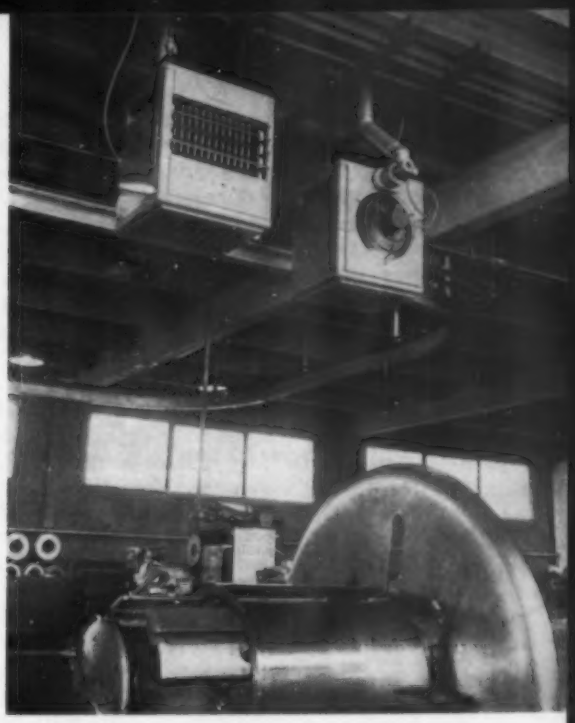
Maximum recommended temperatures are: 300 F for mold finished sight glasses, 400 F for annealed annular edge and Pyrex brand plate glasses, 500 F for tempered annular edge and Pyrex brand plate pressure windows and 1650 F for Vycor brand plate glasses.

If the right glass is selected and then properly cared for, a sight glass can be vital to successful industrial processing—making work easier, controlling processes better and resulting in better products at lower costs. **End**

Courtesy Pfaudler Div., Pfaudler Permutit, Inc.

Operator peers through sight glass to keep a close check on the condition of the batch in process in large kettle.

PLANT'S SWITCH TO UNIT HEATERS SAVED SPACE AND MONEY



Fifteen fan-type unit heaters, with a capacity of 200,000 Btu each, are hung out of the way. Net result: a saving of 800 sq ft in storage space.

MORE THAN $8000 was saved by the Greer Steel Company, Dover, Ohio, during a building expansion program by installing unit heaters instead of expanding the company's old steam heating system.

In expanding the building by one-third to its present 36,000-sq ft area, the existing boiler system was too small to handle the added heat requirement. As a result, the company had to decide whether to install a supplemental boiler, or a larger one, or convert to another method of heat. After careful consideration and consultation, the company decided to install gas-fired unit heaters.

It would have cost more than $17,000 to expand the steam heating system and to enclose the enlarged boiler facility in a fireproof room to conform with local codes. In contrast, the unit heater installation for the entire building cost only $9000.

Fifteen fan-type unit heaters, produced by the Reznor Manufacturing Company, were installed in the Warehouse Division's building, each equipped with a mechanical vent exhauster. The steam boiler system was dismantled when the heaters, with a combined capacity of 3,000,000 Btu, were installed. The company also gained 800 sq ft of storage space formerly occupied by the oil-fired steam boiler.

Another plus from this installation was the use of the 15 fans on the heaters for air circulation during the summer months.

The heaters, each of 200,000 Btu capacity, were hung approximately 15 ft above floor level. Each is controlled by a lock-type thermostat and is equipped with a motorized flue exhauster.

In many cases a 45-degree angle in the flue pipes was needed to clear purlins in the roof superstructure and allow venting directly through the roof. The venting feature in the heaters overcame the resistance to the flow of flue gases caused by these elbows, and assured positive and safe venting. In addition, this eliminated any possibility of downdrafts through flue pipes.

One heater is hung at the side of overhead doors at each end of the building to overcome drafts when trucks enter the structure for loading and unloading. The remainder are hung along a center aisle through the length of the building.

This installation is engineered to heat the building to 70 F at 0 F outside temperature, and uses 110-v controls. Porter Heating & Plumbing Company, New Philadelphia, Ohio, installed the heaters under the supervision of Paul A. Prince & Associates, consulting engineers, Dover. **End**

Over-all view of the steel plant shows how the unit heaters are installed throughout the building.

ATTITUDES TOWARD WASTE WATER PROBLEMS

By E. G. PAULSON, Staff Engineer, Hall Laboratories, Hagan Center, Pittsburgh, Pa.

IS YOUR PLANT an offender—are you contributing significantly to the pollution of John Doe Stream? If your answer is "no" are you still uneasy because you are not sure it might not change to "yes"?

In some cases, it is known that not more than one part per million—one pound of such metals as lead, copper, or hexavalent chromium may be allowed in a million pounds of effluent.

But what does a part per million look like? Imagine that you have a million pounds of water. This would be approximately 120,000 gallons—enough water to occupy a space 20 ft by 20 ft by 40 ft, or to fill nearly four miles of pipe one foot in diameter. If one pound of copper is dispersed in this water, you will have a one part per million relationship.

The strength of plant solutions is commonly expressed in terms of ounces per gallon, per cent or grams per liter. A concentration of one ounce per gallon is equivalent to 7500 ppm. A one per cent solution contains 10,000 ppm. One gram per liter is 1000 ppm. Conversely, a concentration of one ppm is equivalent to 0.0001335 oz per gallon, or a 0.0001 per cent solution, or 0.001 gram per liter.

If a usual routine analysis for production control were conducted on solutions containing so little, the results would probably be reported as negligible. Yet in terms of waste water analyses, a concentration of one part per million may mean a waste water polluted to an unacceptable extent. In fact, for some constituents a concentration of 0.1 ppm may be sufficient to pollute a waterway.

To introduce by accident one part per million of contamination into industrial plant water is not a difficult thing to do. For example, you may be circulating a solution which contains 10 oz per gallon, equivalent to a 7.5 per cent solution. Assume cooling water on the pump is flowing at the rate of 20 gpm. If this pump leaks one drop of the recirculating solution every 30 sec into the cooling water, contamination will amount to one part per million.

Here and there we might find a few truly fortunate plants that do not have waste water problems. In the great majority of industrial plants that do, people may treat them in the following ways:

1. Ignore them.
2. Realize their existence through payment of sewer surtaxes for excessive pollution.
3. Feel problems should not exist since waste treatment facilities have been installed.
4. Realize that they are discharging contaminated water, but have no idea of the magnitude of the pollution loading contributed by the plant's effluents.
5. Recognize existence of problems and through systematic approach will select the most economic and effective treatment of effluents.

1. Ignoring The Problem

Even though it is regrettable, the man who knows that he has an industrial water problem may sometimes choose to ignore it until the state authorities are at his doorstep.

For example, a metal-finishing operation may be losing certain heavy metals, such as chromium, nickel, and copper, into the waste effluent. These metals may be accompanied by oils, acid and alkaline materials.

Occasionally in this production process a mishap may result in the discharge of a concentrated solution with the industrial waste water. The plant's effluent flows into a small stream, which at certain times of the year has practically no water flow. You can guess the rest.

When these slugs of concentrated waste hit this small receiving stream, fish are killed in the vicinity of the plant's outfall and often for some distance downstream.

Naturally, the state fish and game commission does not take kindly to fish killings. It informs the firm that, if the pollution continues, a court injunction will be obtained. The plant is stopped from discharging any more contaminated waste water to the stream. The commission also mentions that a sixty-day grace period will be allowed for a permanent solution to the problem.

In desperation, a quick answer is sought. A water treatment system used in the plant to condition influent water offers an apparent means of escape. Waste water is cycled through this unit in an effort to remove the contaminants while still allowing reuse of the water.

However, since the effluent from the treating unit is far from satisfactory for further use in some operations in the plant, additional water is continually introduced. This water, contaminated in process, then joins the cycle.

In such cases, time is needed so that facilities can be designed and constructed. Time can usually be obtained by the initiation of temporary measures to abate pollution, but these measures are sometimes very expensive. Lagooning the effluent or installing temporary treatment facilities may gain the desired delay and enable management to postpone decisions on the treatment of the waste waters. However, such measures certainly do not solve the problems.

2. Effluent and Sewer Tax

Let's consider the case of the manufacturer who determined by the size of his sewage bill that he was contaminating a surface water supply. The plant obtains its water from a municipal system and from wells located on plant property; waste water is discharged to the municipal sanitary sewage system and to a small creek nearby.

Theoretically, only uncontaminated cooling water is entering the creek. However, studies by the municipal authorities have proved that the plant's effluent to the creek contains high concentrations of suspended solids and oil.

According to the municipal ordinance, pertaining to

this case, a plant is charged a surtax if its industrial waste waters contain concentrations of suspended solids and B.O.D. (biochemical oxygen demand) which are higher than what one would normally expect in sanitary sewage.

Furthermore, if a plant is discharging polluted waters to a surface water supply, payment of sewer tax and surtax on this water is required. The tax ratio is the same as that for discharging such water to the municipal sanitary sewage treatment system.

Arrangement for a survey was made to determine the sources of contaminants in that part of the effluent which was being discharged to the surface water supply. Once the sources of pollution had been located it was necessary to eliminate contamination or else to divert the waste waters to the sanitary sewage system. Of course, if the waste waters could be classified as suitable for discharge to a surface water supply, sewer tax payment on this volume of water would not be required.

The survey resulted in a solution of the problem. It is estimated that the plant's sewer tax, including the surtax, will be reduced from $600 per month to approximately $75.00 per month.

3. Non-Use of Facilities

Sometimes an industrial plant may have a waste treatment plant, but it is not operated so that it will produce an effluent of satisfactory quality. Take the case of a metal finishing plant with a small acid-pickling operation. Initially, this plant's effluent contained the usual contaminants: oils, solids and some acid.

The oils and solids were eliminated from the effluent by good housekeeping practices within the plant. However, it was necessary to install a neutralization facility to treat the rinse waters from the acid-pickling operation.

A simple water treatment system was installed to feed caustic soda into the rinse water in proportion to the flow of the rinse from acid pickling. Treated water was then transferred to a holding tank to even out fluctuations in the acid content and to settle out suspended solids. A swing pipe was installed in this tank to remove the clear supernatant liquid.

The pH of the water was to be determined periodically to ascertain whether the ratio of caustic to acid was correct. It was estimated that approximately once every six months the sludge would have to be removed from the settling tanks.

It is not unusual to find personnel who do not like the idea of handling solutions of caustic soda. Generally, if the personnel are properly educated in the use of these materials and provided with the proper safety equipment, this initial hesitancy can be overcome.

In this case, however, it appeared that the plant engineer's office was receiving little cooperation from the shop foreman who was responsible for the operation of the acid-pickling tanks. The neutralizing equipment was not used for a period of about six years after being installed. It is now being operated following a change in personnel.

4. Wasted Raw Materials

Let's look next at the case of a plant management which has a waste water problem and recognizes this fact. It makes some preliminary studies to determine the sources of contaminants, but still has no concrete idea of the magnitude of the pollution contributed to the stream.

During a preliminary survey it was noted that the plant was using a clay solution as a coating for an intermediate product. It was originally felt by plant personnel that at least 90 per cent of the clay was adhering to the product.

To recheck the first gaging and sampling program, a second one was executed. Analysis of composite samples of the plant's effluent again showed a much greater quantity of suspended solids being discharged than would be expected. To pin down the source of the solids in the plant's effluent, a positive identification was made of the suspended material. This identification together with the other data definitely proved that 90 per cent of the clay was being discharged to the stream rather than that much going on the product.

To correct this situation, the plant process was revised by the joint efforts of the plant's engineering staff and the consultants on water. It was estimated that due to the savings in raw materials the cost of the change would be written off in a period of approximately nine months.

5. Solution Takes Time, Planning

More and more managements have been working on long-range programs to arrive at sound decisions on the procedures and facilities needed for treatment to make their waste waters acceptable for discharge. There is the encouraging story of a plant making use of a water consultant steadily and consistently over the years.

When this plant was first surveyed combined wastes from both sanitary and industrial facilities were involved. The first recommendation was the segregation of the sanitary wastes into one sewer line for discharge to a municipal sewage treatment plant.

Since the initial survey showed that the plant's process waste effluent was originating at approximately seven operations, samples from each operation were analyzed. Three of the waters were found to be uncontaminated practically all of the time. One was contaminated only occasionally. The plant's usage of water was then changed in an effort to further reduce the volume of contaminated water which had to be treated.

After all in-plant changes were completed, the plant was resurveyed and it was determined that one rinse water and two concentrated solutions, dumped batchwise, were the sources of contamination. Efforts of the manufacturing plant's personnel aided by laboratory facilities of the water consultant resulted in a development of a procedure for treatment of plant waste.

However, it was evident that the plant was discharging a considerable quantity of heavy metal in the effluent. An economic survey of a proposed treatment indicated the possibility of recovery of sufficient metal to actually increase income by approximately $300.00 per operating day.

Because of the major saving, the manufacturing process was completely revised to reduce the wastage of metal. These process changes resulted in the volume of contaminated water being reduced.

Not all projects for treatment of wastes can have such an economically happy ending. The long-range rather than the frantic approach can, however, greatly reduce the chance of costly error in meeting the ever more stringent requirements for control of industrial pollution. **End**

Fig. 1. Dirt clogs ventilating spaces, raising motor heat.

Fig. 2. Commutator sparking is frequently traced to dirt.

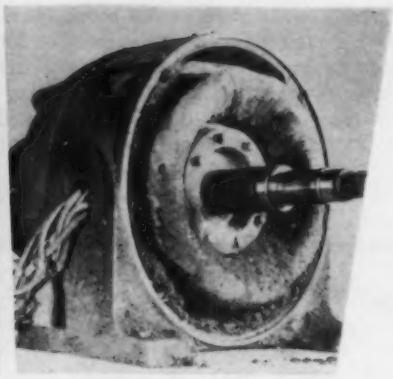


Fig. 3. Heat is trapped in this motor by heavy layer of dirt.

Four Ways You Can STOP MOTOR FAILURES

By R. L. KIRKPATRICK, Manager, Maintenance Sales
Westinghouse Electric Corporation, Pittsburgh, Pa.

INDUSTRIAL electrical motors are expected to operate satisfactorily under a wide variety of conditions. These include temperatures ranging from above the boiling point of water to below freezing. They operate in air or under water and in many combinations of contaminated atmospheres.

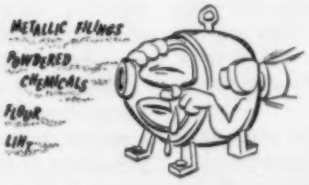
Because most well designed motors will operate under adverse conditions, it is easy to believe that they will perform satisfactorily under any set of conditions. However, we all know that motor failures are a fairly common occurrence in the average industrial plant.

Why do motors fail? In most cases the only answer you will get to this question is that the motor burned out. This may have been the end result but was the burnout due to an overload or are there other factors to be considered?

We, at Westinghouse, are in a good position to answer the question: Why do motors fail? Each year, many thousands of motors come to our nationwide network of repair plants because they have failed. Inspection and test of these failed motors has shown that 90 per cent of these failures resulted from just four basic causes. These are dirt, moisture, vibration, and friction.

These causes are simple, in fact so simple that most maintenance men refuse to believe it. However, these are well documented facts and since fully 90 per cent of these failures result from these four basic causes, we should try to do something about them. Here are some simple suggestions on ways to reduce motor failures based on broad experience in the motor repair field.

Dirt



Dirt is any kind of foreign material that finds its way into a motor. It can be ordinary dirt that rises into the air when workers walk and trucks operate about the plant. It can be metallic filings blowing into a motor in a machine shop. It can be powdered chemicals found in the atmosphere around a processing plant or in the case of a textile mill it can be nice white lint. White or black, when it finds its way into a motor it is dirt.

Dirt in any form can be deadly to a motor. It can plug ventilating spaces and interfere with proper cooling of the motor, Fig. 1. It can also glaze the faces of commutator brushes resulting in harmful sparking, Fig. 2. It can also abrade sliprings, multiplying wear and impede current flow.

Dirt can blanket windings, interfering with proper heat radiation and causing dangerous temperature rises, Fig. 3. If metallic particles are present, it can create a hazard by shorting or grounding the motor windings, Fig. 4. If not corrected, it can eventually cause a complete breakdown of the insulation.

These conditions should never be allowed to occur, and they will not occur if precautions familiar to all of us are really taken. In the case of totally-enclosed motors, anti-dirt precautions boil down to the periodic use of a wrench. At regular intervals all exposed joints in the motor frame should be tightened, Fig. 5.

In the case of open-type motors, good maintenance includes additional anti-dust precautions. Care should be taken to make sure dirt is kept out of bearings and that oil filler caps are

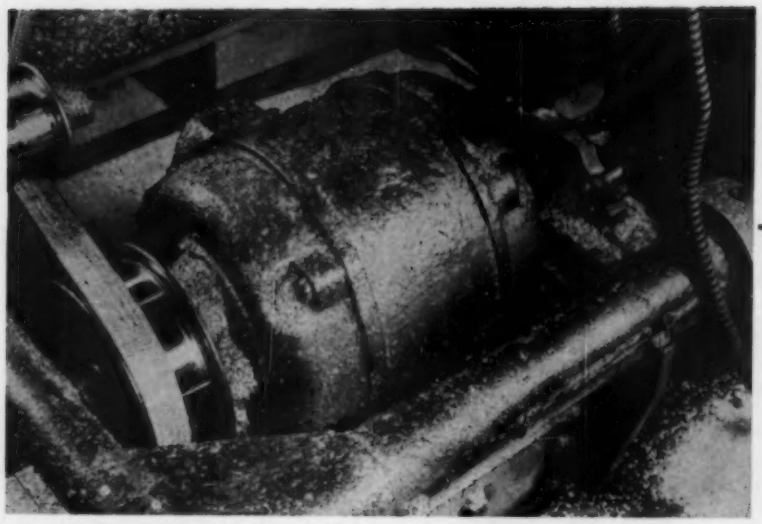


Fig. 4. Metallic particles can work their way into windings, causing shorts and breakdown of insulation.

always closed. Make sure dust seals and gaskets are in good condition to prevent entry of dirt. If they are worn, be sure to replace them promptly, Fig. 6.

Have plenty of clean rags on hand and at regular inspection intervals see that they go to work, Fig. 7. Wipe off motor housings, clean commutators and sliprings and remove dust from the windings. For all of these wiping operations it is important to use rags, not waste. Waste contains lint which adheres to the surface it contacts.

Once a month, or oftener if necessary, blow out the windings with dry compressed air at a pressure of between 30 to 50 lb. Make sure the pressure is not greater than this or the blast may loosen the insulation and blow dirt under it.

In some cases, using compressed air to clean motors is impractical because critical operations nearby might be impaired by the displaced dirt. In these cases, vacuum cleaners employing air suction should be employed, Fig. 8.

At times, neither of the above methods will adequately clean a motor. If the accumulated dirt has remained long enough to unite with grease or oil, it tends to stick so stubbornly that a special solvent may be required, Fig. 9. Three types of solvent are in general use for this purpose.

Of the types used, the petroleum distillates have the least corrosive action on insulation varnishes. For this reason they are preferred if the dirt is easily removed. For tougher jobs, a mixture of petroleum distillates and carbon tetrachloride will probably suffice. This particular mixture is

Fig. 5. Tightening motor frame bolts keeps the dirt out.

Fig. 6. Dust shields and gaskets must be in good condition.

Fig. 7. At regular intervals, wipe motors with a clean rag.

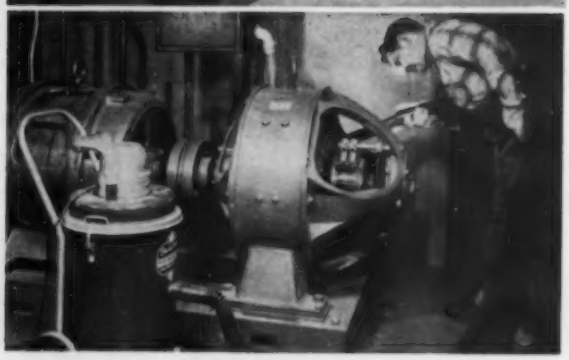


Fig. 8. Use vacuum cleaner to remove dirt from windings.

Fig. 9. To remove oil-soaked dirt, use a solvent to clean windings.

nonflammable although its vapors may be explosive.

In extreme cases, straight carbon tetrachloride may be necessary and plant safety rules regarding its handling should be closely observed. The solvent fumes can be poisonous.

Plant safety rules should also be followed closely in the handling of petroleum distillates. Workers should be cautioned against causing accidental sparks during the washing process. If these precautions seem troublesome, remember there is one sure way to avoid them. Don't neglect a dusty motor. If the dirt is removed before it has a chance to soak up oil and water, solvents will not be needed.

Moisture

Moisture, like dirt, can prove deadly to a motor. It soaks and softens windings until the insulation will no longer hold the voltage. Once inside a motor, it unites with any dirt present to form a sticky mass. It also absorbs acid fumes and alkali fumes when these are present and quickly changes the moisture from mere water to an actively destructive agent.

Here again, we have conditions that should not occur if maintenance is really doing the obvious things we all know about. Anti-moisture precautions are usually very simple. Open motors should always be guarded against accidental exposure to water from any source, Fig. 10. Standby motors should be run a little at least once a week to guard against moisture condensation during periods of idleness.

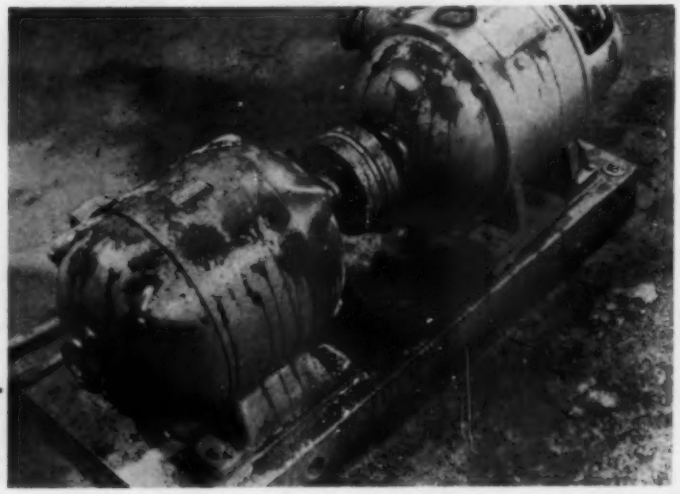
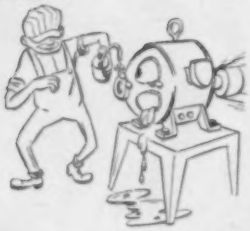


Fig. 10. Open motors should be well guarded against dripping water.

Friction

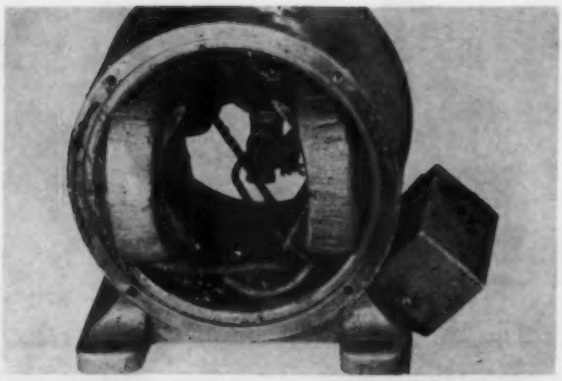


Anti-friction precautions are both simple and easy to take. In sleeve bearing designs, oil adheres to the shaft and is dragged along by rotation. In this way, a lubricating film is formed that prevents friction if certain precautions are observed. Follow the lubricating instructions of the motor manufacturer and use the right kind of oil in the proper quantities at intervals suggested for your application.

Do not add new oil to a sleeve bearing motor while the motor is running. A certain amount of the lubricant rides the ring over the oil level and you may be fooled into adding too much oil. This excess oil is almost sure to leak into the interior of the motor.

Leaking oil can do serious damage to an electric motor, Fig. 11. It can deteriorate mica insulating segments between commutator bars and soak windings to the point where re-winding may be needed.

In the case of motors equipped with ball bearings, the most important precaution to observe is to make sure the inner race is tight enough on the shaft to rotate with it but not so



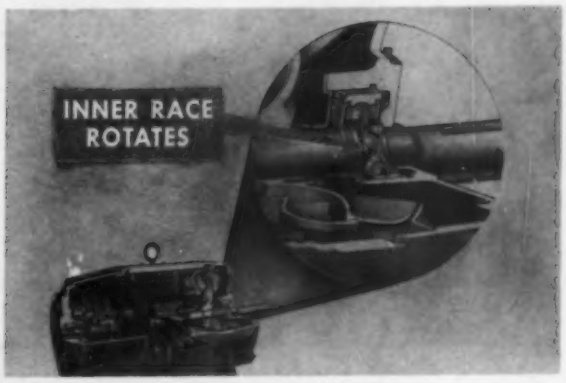


Fig. 11. Typical oil-soaked winding commonly caused by adding too much oil when lubricating sleeve bearings.

Fig. 12. Inner race in ball bearing must fit tight on motor shaft but should not be tight enough to cause distortion.

Fig. 13. Make sure grease is clean and of the right quality. Don't overgrease as it will make motor bearings run hot.

tight as to cause distortion, Fig. 12. Another important precaution involves correct greasing. Apply the right grease as recommended and be sure your grease is clean. Don't overgrease as excess grease promotes friction and heat, Fig. 13.

Check frequently for misalignment. Foundation settling, heavy floor loading and excessive bearing wear may be causing vibration through misalignment. Vibration in the driven machine may be transmitted to the motor and require special attention. Excessive belt or chain tension, Fig. 14, may be at fault. Loose bearings may cause the motor shaft to oscillate. Don't forget the possibility that motor mounting bolts may have worked loose, Fig. 15.

To summarize, our experience with a wide range of motor failures indicates that fully 90 per cent of these failures are due to just four causes. These are dirt, moisture, friction and vibration. All of these are familiar to experienced maintenance men and all are preventable. **End**

Vibration

If excessive vibration is permitted to develop in a motor, parts can be shaken loose, electrical connections can be broken, portions of the metallic structure may become crystallized and frictional wear of every kind is greatly increased. To avoid these consequences, a few simple checks should be made regularly.

Fig. 14. Excessive belt tension can transmit vibration.

Fig. 15. Vibration may be caused by loose mounting.

SCIENTISTS *ARE* PEOPLE!

. . . and good ones, too, says Author Bill King. Their problems govern their needs and their actions, and it's the plant engineer's job to lighten their load

Editor's Note: The following article may sound, at first reading, to have been written as a rebuttal to the article, "The Care and Maintenance of Scientists" that appeared in our June issue. Actually, Mr. King submitted his article in April, greatly preceding publication of the abovementioned article. What's more, he had no knowledge that such an article had been written. There is no doubt, in our minds, that both articles reflect actual conditions, conditions that could exist in the same plant, on the same day. The obvious difference lies in the reaction of the plant engineer to these conditions. Some are critical of the scientists for being "different." Others, such as Bill King, understand and sympathize with the scientist. It's their problems that are different.

FROM THE TREMENDOUS growth in research during the past decade has arisen a new industry creating a new atmosphere for many plant engineers. In his never-ending search for better methods and more efficient procedures, the plant engineer faces fresh challenges in the fields of personal relations, plant layout, maintenance, and cost control. It is time for a report on this new industry.

Prior to World War II the research and development laboratories in this country were limited to the various universities plus a very few nationally known institutions such as the National Bureau of Standards. These laboratories supplied the country with most of its pure research. It is true that a number of our major industries maintained research and development laboratories, but most were set up as departments of particular industries for the specific purpose of product development. Their efforts were concentrated in the fields of petroleum, steel, electrical equipment, and textiles.

World War II produced the need for a tremendous amount of research in the field of nuclear energy. Since the Japanese surrender the need for new sources of power and energy for peaceful purposes as well as for defense has led to a phenomenal growth in research and development plants. Today they form a major division of American industry.

For these new research and development plants, the need for plant engineers was met by drawing upon

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Staff of Medical Science and Technology Laboratory at Avco/RAD undertake a wide variety of research projects in bio-medical, surgical and dental fields. Specialized nature of lab work creates problems for plant layout engineer.

the talent and skill of the manufacturing industries. While many of the basic engineering and managerial principles of plant engineering which we brought with us from the production lines are still applicable, there are certain fundamental differences which must be taken into account if the plant engineer is to be successful in serving America's new "research industry." Enough time has elapsed to allow a fair evaluation of the problems of the plant engineer in this new atmosphere.

The logical point to begin a discussion of the subject is with the man requiring our services and indeed whose need for these services justifies our existence. Lo! the poor scientist. No individual has been subjected to more searching inquiry than he. He has been taken apart, dissected, put together again, and then the whole process repeated time and time again in an effort to see what makes him tick. He has been investigated, and questioned, and quizzed as to his beliefs on religion, economics, politics, sex—and sometimes science—as no other professional man has in the past. Among the anti-intellectual set he has been pictured as a long hair, an egghead, an impractical guy on cloud nine. Now just what sort of a person is he?

Rigidly-controlled temperature and humidity in this computer room intensified plant engineering problems. Tiled floor has an under-duct arrangement to aid relocation of equipment and eliminate exposure of cables.

I have spent fourteen years serving the scientific community. During that time I have known many scientists. This experience convinces me that, as people, scientists do not differ from any other group. There is a difference, of course, in dealing with the scientist as contrasted with the production man. But this difference is due to the nature of his work.

Because the scientist is dealing with the unknown, he cannot always give specific instructions for his requirements. This is the major difference.

He usually feels that the job he requested is more important than any one of the ten other jobs requested by his colleagues.

He will order a job requiring three

days' work and expect it to be completed by the next morning.

He will quarrel over the amount of an estimate and tell you that his wife could do the job in half an hour using only her poultry shears and little tack hammer.

But show me the production man who hasn't done and said the same things. Basically the scientist is a pretty calm and down-to-earth individual. Contrary to popular opinion he is definitely not on cloud nine but has both feet on the ground. On the personal side he is fair-minded, considerate, and a regular fellow.

The first thing that strikes the production shop visitor to the R & D plant is the lack of grouping of operations which appear to be similar. Other than in the main cafeteria or the library, one is likely to find bench lathes, drill presses, furnaces, or work benches in any part of any building including executive offices. Closer inspection reveals, however, that while some operations appear to be similar there is a fundamental difference in the work being carried on by a group working on the development of some new material and a group studying electrical phenomena in a rarefied atmosphere.

Inasmuch as the laboratories occupy a major portion of the available space, it is necessary to provide heavy power and other utilities throughout the plant rather than grouping them as in production plants.

The power requirements are unique in the multiplicity of voltages and frequencies used and in the large amounts of d-c power required. To supply these needs it is necessary to install and service large banks of batteries, motor-generator sets, and rectifiers. Such equipment is installed over a wide area requiring the electrical section to have qualified men and material ready for any emergency throughout the plant.

Gas distribution systems are another area which require special care and attention. In most R & D plants hydrogen, oxygen, nitrogen, argon, and helium are the commonly used gases. Installing and maintaining such systems is complicated by the extremely high pressures required. This necessitates exacting standards in piping installation procedures and in periodic inspections for possible leaks.

Fume and dust control is another problem area for most R & D plants. The material used is often highly toxic and demands careful handling. Exhaust hoods, both open and closed, are common sights in an R & D plant. Many of the gases are corrosive requiring the use of PVC pipe and fittings. Exhaust hoods may present difficulties in maintaining balanced atmospheric conditions within the building. This, in turn, complicates the problem of heating during the winter months.

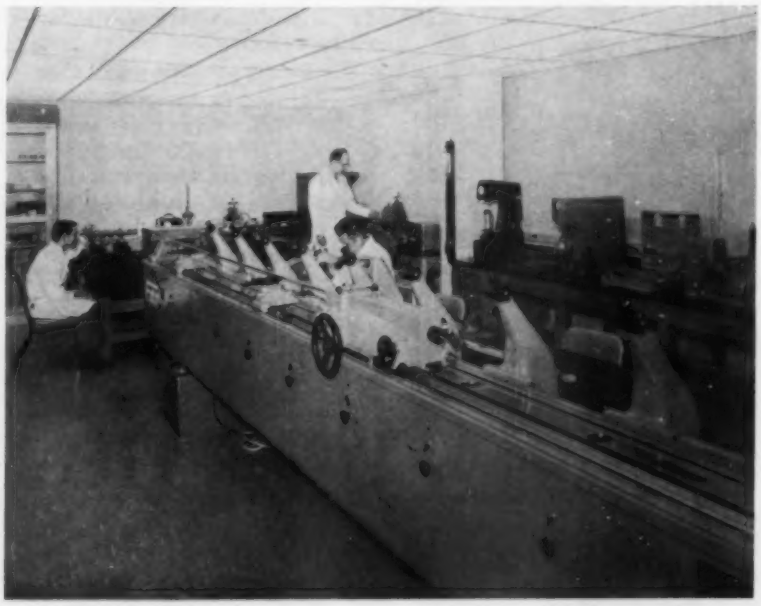
We're Forever Moving

In the manufacturing plant the main effort is directed toward the maintenance of existing facilities. In the R & D plant the main effort is in rearranging the physical plant to meet the changing requirements for new projects. In most cases there is no advance notice of what is to come. I have heard R & D plant engineers complain about the lack of planning on the part of the scientist. This complaint is not always fair. Often the order to rearrange a laboratory is the result of an unexpected scientific breakthrough.

Rearrangement projects are usually done on crash basis. This creates an erratic work load curve with extremely high peaks of short duration, making it difficult if not impossible to project manpower requirements. During these high peak periods it is imperative that the plant engineer have on call reputable contractors whose men know his plant and who can step in at a moment's notice and pick up the overload.

Herbert D. Sprenger of American-Standard Industrial Division says that the main job of the plant engineer is to save the company money. This is just as true in an R & D plant as it is in a production shop. In an R & D plant, however, the plant engineer does not have the guide lines which are available to his brothers in the production shops. For those engaged in nuclear and space engineering the unusual is the usual and what is new today is obsolete tomorrow.

In this area of America's industry there is no sales forecast to assist the plant engineer in projecting his dollar requirements. To keep pace with the floodtide of scientific achievement the R & D plant engineer must lay aside one of his most trusted aids, the budget, and adapt himself to a system of rigid cost control whose boundary lines while less well defined are just as unforgiving to the man who violates them. **End**



Measurement standards are monitored as closely at Avco as at the National Bureau. Constant 68 C temperature is maintained in room holding long-length measurement machine.

A Primer on Temperature Measurement—

MEASURING INDUSTRY'S HOT SPOTS

By E. F. UPTON, Jr., Chief Engineer, Daystrom Inc.
Weston Instruments Division, Poughkeepsie, New York

PART II—

Resistance Thermometers, Circuits and Filled System Thermometers

RESISTANCE THERMOMETERS depend upon the inherent characteristic of electrical conductors to change resistance when they undergo a change in temperature. Both metallic conductors and semiconductors are used in this way.

Industrial resistance thermometers are generally constructed of platinum, nickel, or copper. Practical use as temperature measuring devices depends on knowledge of the resistance changes with temperature and then measuring the resistance. Calibration is directly in terms of temperature. There are no cold junction references or other corrections necessary to interpret the reading.

Referring to Table III we find the approximate temperature ranges over which the three major wire types are useful. The information in this table is by no means definitive. It resembles the table of recommended maximum temperature limits for thermocouples in this respect. Maximum temperature for a given physical construction depends more on the construction itself than the wire used. The type of insulation used and the manner of winding the wire to avoid effect of mechanical strains do more to determine temperature range than type of wire.

Nickel is the most commonly used material. Platinum has much more ideal characteristics, but cost is obviously against it. It is in many ways surprising that copper has not been more popular as it has many of the good qualities of platinum at a much lower cost. Unfortunately it has low resistivity.

The temperature coefficient of nickel has not been precisely controllable, so that many industrial units include partial windings of a zero temperature coefficient material. This has the effect of changing the temperature coefficient of the nickel. Both copper and platinum are uniform enough so that this need not be done for these materials. Accuracies attainable in industrial constructions are plus or minus 0.5 F to 1.5 F depending upon temperature and constructions.

In Fig. 13 temperature resistance characteristics of some typical thermistor materials are compared with that of platinum. As can be seen, thermistors are remarkable in two respects. First of all, the resistance decreases with temperature instead of increasing as do most metals. Secondly, the resistance change with temperature is enormous. Thermistors have not been standardized well enough in characteristics to make them too attractive for general use. Further, their characteristics are decidedly non-linear. However, when a device is required with extreme sensitivity to changes in temperature, they have no peer.

Temperature averaging is done with resistance thermometers by distributing the winding over a length. Long

WINDING MATERIAL	TEMPERATURE RANGE (APPROX)	RESISTANCE (TYPICAL)
Platinum	−258 to +900C	25 ohms at 0C
Nickel	−150 to +300C	100 ohms at 25C
Copper	−200 to +120C	10 ohms at 25C

Table III. Approximate temperature ranges for platinum, nickel, copper resistance thermometers.

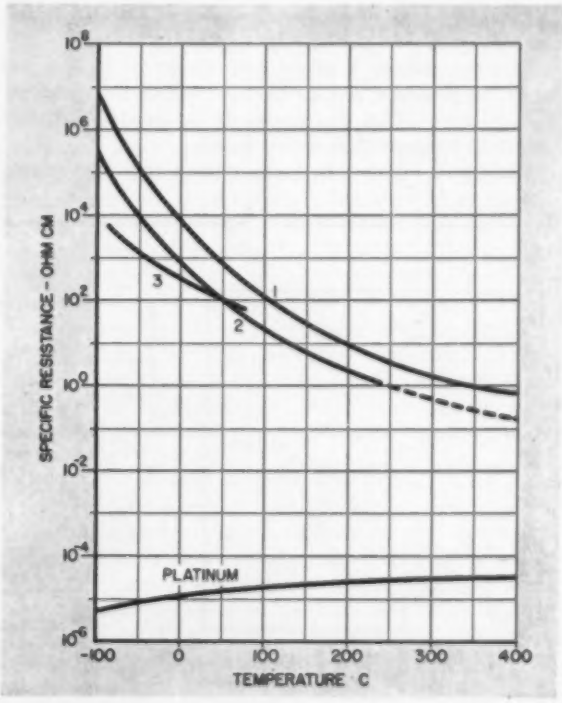


Fig. 13. Temperature resistance characteristics of thermistor materials compared with platinum.

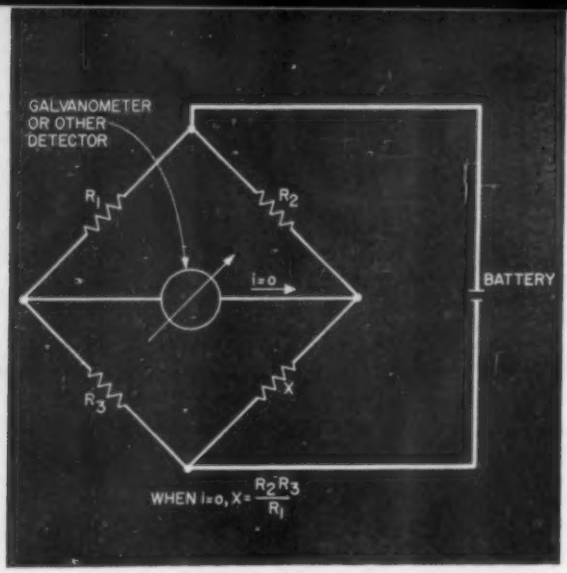


Fig. 14. Circuits used with resistance thermometer bulbs are similar to a Wheatstone Bridge.

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bulbs up to 30 to 40 ft are available for this purpose. Most of the circuits used with resistance thermometer bulbs are quite similar to the classical Wheatstone Bridge circuit. A simple form of this circuit is illustrated in Fig. 14.

A resistance thermometer bulb is placed in the circuit in the position marked X. Resistors R_1, R_2, and R_3 with X complete a balanced bridge arrangement. When adjusted for zero current through the detector, the relationship between the four resistors is as follows:

$$X = \frac{R_2 \times R_3}{R_1}$$

Battery voltage does not affect the true bridge balance. It does, however, affect the sensitivity of the circuit and the ability to find the true balance point.

Provision for simple adjustment of the current to a null condition is shown in Fig. 15. Contact of the slidewire, SW, is moved until the circuit is balanced. A further necessary refinement is shown here.

Resistance thermometers are usually remotely located from the instrument and attention must be given to the resistance of connecting wires. In the circuit, Fig. 15, three conductors designated L_1, L_2 and L_3 connect the bulb to the circuit. Note that L_2 appears in series with resistor, C, while L_3 appears in series with X. If C and X are equal, L_2 and L_3 do not affect the point of bridge balance. Since in this circuit no provision for adjusting C is included, this condition occurs at only one value of X. If the resistance of the bulb and the resistor, C, is high enough, the compensation for lead resistance is reasonably good.

This circuit is not satisfactory for use with most normal resistance bulbs and is used generally when bulb resistance is over 500 ohms. Calibration of the circuit is somewhat non-linear.

The third bulb lead appears in series with the battery and has no effect on calibration. Its only purpose is to permit arranging the circuit for cancellation of the effect of the other two.

For most purposes the circuit shown in Fig. 16 is more satisfactory. Two slidewires driven in tandem are used. Slidewire, SW, maintains the arm of the bridge containing C at a value equal to the bulb resistance. Compensation of connecting wire is much better, theoretically perfect. Perfection here is limited only by the accuracy of matching L_2 with L_3.

In this circuit, as in the previous two, the battery volt-

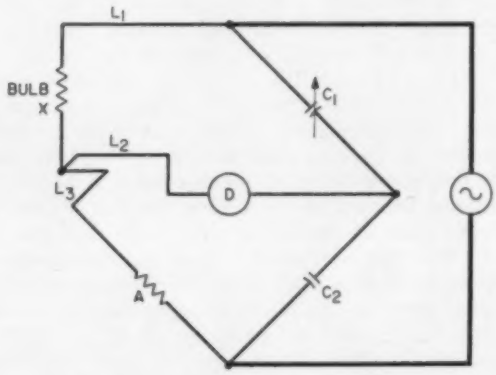

Fig. 17. Circuit specifically intended for a-c power supply.

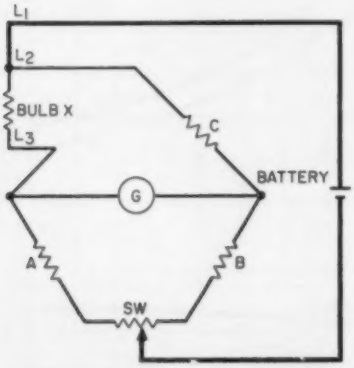

Fig. 15. Slidewire provides simple adjustment of circuit to null position.

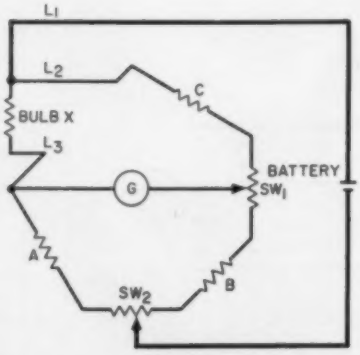

Fig. 16. Two slidewires, driven in tandem, provide a satisfactory circuit.

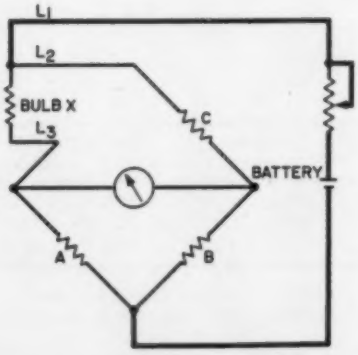

Fig. 18. Unbalance in this circuit is read on a deflectional galvanometer.

age does not affect calibration but does affect sensitivity. Batteries have been largely supplanted for this purpose by solid state power supplies to minimize failures and maintenance. Power supplies for this purpose are less sophisticated than the precisely regulated power supplies required for potentiometer circuits.

As a matter of fact, all of these circuits will work satisfactorily with a-c power supplies instead of d-c supplies if reasonable precautions are taken. If the bulb resistance is too high, lead capacitances will cause the a-c balance point to differ from the d-c balance point.

A circuit specifically intended for a-c power supply operation is shown in Fig. 17. The capacitor, C, is adjusted until the following relation is obtained.

$$\frac{X}{A} = \frac{C_1}{C_2}$$

Here again two connecting leads appear in different arms of the bridge, permitting cancellation of their effect.

All of the previous circuits were adapted to automatic rebalancing by a servomotor driven from a moderate gain amplifier. The circuit in Fig. 18 is a deflectional circuit. The extent of the unbalance in the circuit is read on the deflectional galvanometer calibrated directly in temperature.

In this circuit, the battery voltage is now important to the calibration of the circuit. Provision is therefore made for adjusting the voltage across the bridge. By including proper switching, the galvanometer can be used to indicate proper adjustment. An alternative arrangement would be to provide a well-regulated Zener power supply instead of the battery.

All of the preceding circuits can theoretically be used with either metallic or thermistor element resistance bulbs.

Narrow Ranges Are Possible

Resistance thermometers are quite useful when narrow range instruments are required. Very narrow ranges, 20 F or less, can be supplied. Amplifiers used in normal potentiometers have more than ample gain for such ranges. Raising the supply voltage increases sensitivity permitting narrow ranges. The only limit on this method of raising sensitivity is that currents must be kept low enough to prevent appreciable internal self-heating effects from changing the reading.

Because of the tremendous change in resistance of thermistor type resistance elements, very narrow range instruments are possible. Spans of 1 or 2 F are easily attained as far as sensitivity is concerned. Improvements in manufacturing may improve accuracy and increase the usefulness and popularity of thermistors.

A filled system thermometer makes use of the phenomena that most liquids and gaseous materials expand or try to expand as their temperature is raised. A liquid or gas of known characteristics is totally enclosed, and the amount of expansion in the case of liquids or the pressure change resulting from the attempt to expand are measured. This gives a reading directly related to the temperature of the liquid or gas.

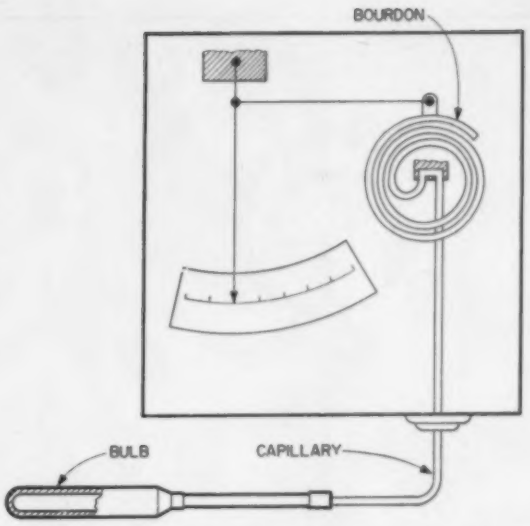

Fig. 19. Filled system thermometers make use of the phenomena that liquids, gases expand as temperature rises.

Fundamental elements of such a system are shown in Fig. 19. The bulb is the sensitive portion of the system which is exposed to the temperature being measured. It is connected by capillary tubing to a bourdon tube.

Various types of fill materials are used for different purposes. Thermal systems are classified according to the type of fill.

Class I	Liquid Fill
Class II	Vapor Pressure
Class III	Gas Fill
Class V	Mercury Fill

In Class I and V fills, liquid and mercury, operation is identical. Expansion of the fill in the bulb causes expansion and movement of the bourdon. Movement of the bourdon is used to actuate various indicating, recording, control and transmitting devices.

In Class I—liquid fills—effect of temperature change of the capillary is minimized by making the bulb volume large compared to the capillary volume. Temperature effects on the bourdon can be compensated by a bimetal element. A variety of liquid materials are used including monochlorobenzene, methyl alcohol, and ethyl benzene.

In Class V—mercury fill—three different capillary temperature methods have been used. When capillary is not overly long, the same method as for Class I systems is used—a large ratio of bulb volume to capillary volume.

In the past, another system using two capillaries, two bourdons, and one bulb had some popularity. In this arrangement the bulb and one capillary-bourdon system connected in normal fashion were opposed by the second capillary bourdon system. The temperature effect on the two systems thus cancel.

The third method consists of inserting a wire in the capillary. The temperature coefficient of the wire is selected so that the effective volume of the capillary increases with temperature just enough to contain the expanded volume of the mercury in the capillary. Thus only the volume change in the bulb affects the reading.

In a Class III—gas filled, thermal system—the general construction is the same as in Fig. 19. As the gas in the

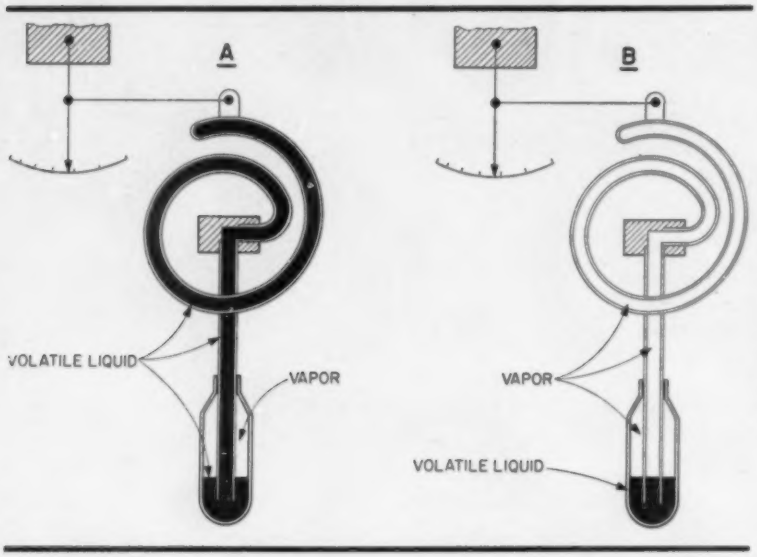

Fig. 20. In diagram A, bulb temperature is higher than capillary and bourdon. In B, bulb is colder, as a result, the liquid collects in bulb.

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bulb tries to expand with temperature increases, the internal pressure in the system increases. The pressure increase causes movement of the bourdon.

A Class II vapor pressure thermal system operates a little differently. Figure 20 illustrates two modes of operation for Class II systems. The system is partly filled with liquid. At any particular temperature a stable equilibrium exists. The vapor pressure is just enough to prevent additional liquid evaporating into a vapor state. As the temperature rises, additional liquid converts to vapor form, increasing the vapor pressure and causing the bourdon to deflect.

In the diagram "A" of Fig. 20, the temperature of the bulb is above that of the capillary and the bourdon. The lower temperature of the capillary and bourdon cause the liquid to condense there.

When the bulb temperature is below that of the capillary and bourdon, the liquid all collects in the bulb, "B".

In either case, the bulb must be large enough to contain enough liquid so that the liquid-vapor interface is always in bulb. This type system is not satisfactory if the bulb temperature must go back and forth past the capillary temperature. Whenever this happens, the liquid must transfer from capillary to bulb and back. This involves considerable time delay.

In Table IV a comparison of characteristics of the various classes of fill is made. Different manufacturers' units have slightly different characteristics. The listing applies principally to systems using bourdons for recording and control instruments.

Filled system thermometers are excellent moderate cost devices. A considerable variety of recording, indicating and control features are available. Accuracies are plus or minus one per cent but there are two limitations. When the bulb must be remotely located from the instrument, care must be taken to protect that capillary from physical damage.

Mechanical power available from the bourdon is more than available from a millivoltmeter but less than that available from a potentiometer. This limits the applicability somewhat over potentiometers but permits more flexibility than with a millivoltmeter. Cost of thermal system instruments tends to be intermediate between the other types as well. **End**

Table IV. Comparison of characteristics for classes of fill.

TYPE	LIQUID FILL	MERCURY FILL	VAPOR PRESSURE	GAS FILL
	CLASS I	CLASS V	CLASS II	CLASS III
Low Temperature	—125F	—38F	—40F	—400F
High Temperature	500F	1000F	500F	1000F
Shortest Span	25F	100F	40F	150F
Longest Span	300F	1000F	250F	1000F
Scale or Chart Divisions	Equal	Equal	Larger at Top of Range	Equal
Bulb Size	⅜" Dia. 1 to 3.5" Length*	⅛" Dia. 1 to 6" Length*	⅜" Dia. 4" Length	⅛" Dia. 6 to 12" Length**

* Varies with instrument span. ** Varies with capillary length

INDUSTRIAL WIRE ROPE SELECTION, CARE AND MAINTENANCE

By C. T. EVENDEN, Jones & Laughlin Steel Corporation
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Fig. 1. Too many industrial wire rope accidents each year are the direct result of laxity in inspection procedures.

TO BUILD a foundation of facts upon which to base technical application of wire rope with respect to industrial uses, we must consider briefly some of its characteristics and properties.

Back of every reputable manufactured rope is a wealth of research, both theoretical and experimental, which is reflected in the high quality of the product. It has been found that slight differences in wire sizes, lengths of lay, number of wires, lubrication, physical properties of the wire, control of rope making processes, etc., have a definite influence on the quality of the wire rope produced. A lack of correlation of these will be a short life in service.

It can be stated positively that there are many hidden values in wire rope which cannot be observed by the ordinary user. Wire rope for industrial purposes covers a wide range of applications, and it becomes increasingly necessary for those who have to do with the installation, maintenance, and removal of wire ropes to be fully posted on wire rope matters.

The first requisite in connection with the use of wire rope is to make sure it is strong enough for the duty which it has to perform. The manufacturers' catalogs contain information as to the ultimate strengths of the various grades and constructions of wire rope normally used. The character of the service should determine the safety factor that is to be employed. For example, overhead traveling cranes handling ladles of molten metal are required, by standards of the largest steel manufacturers, to have a safety factor of eight when new ropes are installed. A further requirement is that the sheaves and drums shall have minimum diameters equal to 18 times the diameter of the rope.

From the safety standpoint, a 6 x 37 class rope is preferred for this service because the outside wires constitute only about 47 per cent of the metallic area and, therefore, if the outside wires were worn through completely at any point, there still remains, on the inside wires, 53 per cent of the rope strength. Therefore, consideration must be given on all rope applications to its reserve strength from which proper rules may be prepared to govern the use, inspection, and removal of ropes.

Strength distribution in various constructions of wire rope is given in Table I.

Rules that are formulated for the selection of a wire rope for an application must be adhered to, to result in the maximum wire rope service. The facets here are many but, on all such installations, you are married to a situation. That is, when a hoist, crane, or other lifting mechanism is purchased, its sheave and drum diameters are established. These may not always be of sufficient diameter to result in the most economical wire rope service. Since we are stuck with these, due to limitations of sheave and drum housings, the only thing that can be done is to choose a wire rope to best satisfy the conditions. A few of the important things to consider are:—

1. Factor of safety
2. Ratios of sheave and drum diameters to the wire rope diameter
3. Reeving through sheaves
4. Multiple layer winding
5. Reverse bends
6. Speed of hoisting equipment

It will be conceded, therefore, that each particular class of service is a law unto itself and rules must be formulated by each rope user to cover the situation. The frequency of inspection should depend on the usual wire rope life, the hazard of accidental injury, and the risk involved from possible rope failure. The more responsible

Table I. Strength of outer, inner rope wires is compared.

DISTRIBUTION OF STRENGTH IN WIRE ROPE		
	Percentage of Total Strengths	
Construction	Outer Wires	Inner Wires
6 x 7	83	17
6 x 19 Warrington	59	41
6 x 19 Seale Patent	69	31
6 x 21	64	36
6 x 25	57	43
6 x 31	55	45
6 x 41	47	53

industrial concerns make periodic examination of ropes and record the condition of each.

For cranes (overhead traveling and other types), a shift to once-a-week inspection may be required. Listed below are the most common things to scrutinize:

1. Operation
2. Lubrication
3. Amount of wear
4. Distribution of wear
5. Number of broken wires
6. Location of broken wires
7. Frequency of broken wires
8. Condition of end fittings
9. Localized wear or injury
10. Safety of rope for operation
11. Diameter
12. Stretch
13. Regular inspection—weekly or as operation dictates
14. Corrosive or rust condition

Careful consideration must be given to the safety factor because it is one of the principal factors, not only in safety, but also in the ultimate rope life that will be secured. A wire rope, during the course of its use, is gradually being worn out and it is important, therefore, to know that it has a sufficiency of strength up to the time it is decided to take it off. It is the final safety factor to which major attention must be directed, because initial safety factors are usually adequate. A test of worn out or removed wire rope should be made by all rope users as far as possible, in order to check the actual condition of the ropes and the judgment of the rope inspector. This is especially true in cases where an accident may cause injury to employees.

The condition of a wire rope when removed from service is a criterion of whether or not it has operated under reasonably good conditions during its life. The user expects to secure equitable wire rope life, which is usually indicated by even and uniform wear throughout the rope where it passes over sheaves and drums.

Service may be measured either in days of service, cubic yards or tons of material handled, miles of travel, number of trips, or any suitable unit, as otherwise the time unit would not be a fair measure of rope service.

Table II. Rope conditions which dictate possible removal.

WIRE ROPE REPLACEMENT GUIDE			
Nominal New Rope Diameter in Inches	Replace at Diam., in Inches	Broken Wires per Foot	
		Class	
		6 x 19	6 x 37
1/2	7/16	15	20
5/8	9/16	11	15
3/4	21/32	11	15
7/8	25/32	8	12
1	7/8	8	12
1-1/8	1	7	10
1-1/4	1-1/8	7	10
1-3/8	1-1/4	6	8
1-1/2	1-11/32	6	8

Poor rope service, which may occur occasionally and which is reflected in shortened rope life, should be looked into carefully by the rope user. Some of the principal causes of this are:

Lack of lubrication — shows as dry, shiny, or rusty condition of the rope

Bad fleet angles — indicated by side wear on rope or flange wear on sheaves

Scored drums — indicated by the rope imprint

Worn sheaves — indicated by side wear on rope or pinched rope

Broken wires — indicated by wear and fatigue, bending fatigue or vibrational fatigue

Excessive wear — indicated by bad abrasive conditions

Kinks — improper operation of the rope

Breaking in service — results of kinks, overload or shock

Loss of diameter — indicated by extreme load or wear

Loss of lay or stretch — indicated by extension of rope lay beyond normal

Figs. 2 and 3. Top: Inspection of guards reduces danger of rope jumping sheave. Bottom: If minimum diameter has been reached, rope should be removed from service.

ALLOWABLE OVERSIZE FOR NEW WIRE ROPE		
Nominal Diameter, inches	Undersize	Oversize, inches
0 to 3/4	0	1/32
13/16 to 1-1/8	0	3/64
1-3/16 to 1-1/2	0	1/16
1-9/16 to 2-1/4	0	3/32
2-5/16 and larger	0	1/8

Table III. Oversize rope tolerances—10 per cent tension.

The last two, loss of rope diameter and stretch, are worthy of careful investigation.

A table for the permissible reduction in diameter and broken wires per foot is given in Table II. Either condition or combination of both should automatically dictate removal.

It can be positively stated that if a wire rope gives poor service there is a definite cause, and careful investigation will usually discover this cause. It may require a very thorough search but, once the cause or causes have been determined, consideration can be given to measures for preventing recurrence of poor service by correcting them. As soon as the unsatisfactory features, whether mechanical or operational, are corrected, the improved wire rope service automatically reflects the better operating conditions.

Wire rope manufacturers fabricate their ropes with an allowable oversize tolerance to Federal Specification RR-W-410-A as shown in Table III. This tolerance is measured with a tension on the rope of not less than 10 per cent nor more than 20 per cent of nominal required breaking strength.

Shortly after a rope is installed, depending on the load, this oversize tolerance may disappear as the result of the strands' progressive adjustment to their proper working position and seating the strands in the rope. After this takes place, the diameter will remain relatively stable until wear or other factors effect a change.

Three Types of Stretch

Within the elastic limit of wire rope, there are three distinct kinds of stretch involved; fabricational, constructional stretch and material stretch. These three types are encountered normally on all wire rope installations. Also, rope elongation can occur if any appreciable loss of lay is permitted. This is not truly stretch but is elongation due to a distortion of the rope. Fabricational stretch is typified by looseness and tolerances made in fabrication and is lost as soon as the rope is placed in service; most of this loss occurs early in the life of the rope. Ropes operated at their recommended factor of safety may be in service a matter of months before most of the stretch takes place.

There are literally hundreds of accidents each year which are the direct result of a lax inspection procedure or no inspection at all. These do not all result in bodily injury but all cause thousands of dollars in damage. The more hazardous the operation, the more rigid the inspection should be.

We cite a case on a new installation of a skip hoist. The skip hoist is a gondola which is loaded with ore, coke, and other constituents used in the manufacture of steel. The gondola is pulled up a slope, usually at about a 60-degree angle, by two ropes. At the top of the slope the ingredients are dumped into the Bessemer converter.

The temperature at the orifice of the converter is in the thousands of degrees range. By the nature of the job, the ropes pass fairly close to the converter opening. Normally, they are protected against excessive heat. Early one morning, the skip hoist rope had broken and the skip fell to the bottom of the slope.

The twin 1-¼ in diameter 6 x 19 Seale, improved plow steel permaset, I.W.R.C right lang lay hoist ropes had been in service better than a year. A first observation was that the ropes were 1-⅛ in. diameter and not 1-¼ in. diameter on the drum with a gradual reduction in diameter back to the skip attachment. All of this diameter reduction was a combination of wear and pulldown.

Points Which Were Violated

Samples taken of the worst section, found adjacent to the fracture, were analyzed. The entire rope had been subjected to extreme heat, as all of the wires were colored to the blue-brittle range, but there were no broken wires. This accident was caused by the absence of formulated rules for inspection. Let's look at the number of points, of the aforementioned list, that were violated.

1. **The operation** — the risk at the bottom of the slope where six men were working and the extreme heat conditions at the top
2. **Lubrication** — absolutely none at the point of fracture
3. **Amount of wear** — excessive
4. **Distribution of wear** — all on one end of the rope
11. **Diameter** — how long the rope was operated with the diameter at 1-⅛ in. we do not know. We do know it should have been removed from service
12. **Stretch** — this skip hoist had a stretch take-up arrangement. It had been some time since they had to take it up because it had stretched to its maximum limit. The absence of any stretch should have dictated removal
13. **Regular inspection** — no regular inspection procedure was being carried out, as all of these indicators of retirement did not occur at one time.

From the foregoing, it is a good bet that had even the lubrication practice been adhered to, they would have caught this section, as it would have been hot and dry on each inspection. **End**

REDUCING EXPLOSION HAZARDS OF AIR COMPRESSORS

This jagged piece of stainless steel pipe was imbedded in the wall following an explosion of a 6000 psi air compressor. A manifold between the third and fourth stages of the compressor became overheated and blew up.

By J. A. MATHE, Lubrication Engineer, E. F. Houghton & Co., Philadelphia 3, Pa.

A LARGE EASTERN shipbuilder has seven two-stage horizontal reciprocating air compressors operating at 100 psi. These units operated safely for more than 20 years until, in 1958, they experienced a bad header fire. After the fire, they looked around to see what caused it and what could be done to see that it would not happen again.

Basically, the cause of explosions or fires in compressed air systems is a buildup of heat to a temperature above the auto-ignition point of the lubricating oil. There are two major factors that contribute to this deadly combination: (1) mechanical failure which permits heat buildup or (2) low auto-ignition point of the lubricating oil.

Sources of heat buildup: A valve stuck in the open position can permit recompression of air, rapidly raising its temperatures. Failure or even a reduction in the efficiency of intercoolers and aftercoolers can result in extreme air temperatures. High ambient temperatures are important, especially in the southwestern section of the country. Running an intermittent duty compressor on continuous duty cycle can also be a contributing factor.

Many of these sources of heat buildup can be minimized by good maintenance or redesign. But, who is to say that this shipbuilder doesn't have a superior maintenance program; or that compressors were not of the best design? After all, these compressors had operated for better than 20 years before there was any trouble. Any piece of mechanical equipment that gives 20 years of trouble-free service is a pretty good machine.

To my way of thinking, then, the reduction of heat buildup does not offer any final solution to the problem of explosion hazard in compressed air systems. From the standpoint of the equipment, there is another approach—detection.

It is possible to put many different types of sensing devices in the system that will indicate when conditions are approaching the danger point. By interlocking the controls, the system can be shut down automatically before the conditions get too critical. It is important to remember that we are talking about controls that will not only protect against explosions today, but as in the case of the eastern shipbuilder, 10 or even 20 years after the compressor system is installed.

A lot can happen to a complex control system in three, four or five years, to say nothing of two decades. I do not feel that this is a realistic solution, either.

Since we have rejected, as impractical, the prevention of heat buildup the only thing left is to make the system explosion-proof in spite of the heat buildup. Since we cannot get rid of the detonator, we must eliminate the combustible. There is only one source of combustible material in a compressed air system—the lubricant. There have been many studies as to whether the explosion medium is from concentration of oil vapor, or an oil mist, or a breakdown of the oil by cracking into gas. These are all academic to you as a compressor owner.

There are two items to consider in evaluating the hazard of a particular lubricant in air compressor applications: 1. flash point; 2. auto-ignition point.

Briefly, the flash point is the temperature at which a fluid will ignite when a bare flame exists over the fluid. The auto-ignition point is the temperature at which a fluid will ignite with no bare flame (or any other source of ignition) present.

Auto-Ignition Point

It is obvious that the auto-ignition point of the lubricant is far more important in air compressor operation than the flash point. It is not likely to expect bare flames or glowing particles to be present in a compressed air system until after an ignition has started.

Auto-ignition is the temperature at which the lubricant will ignite without the inducement of a flame at atmospheric pressure. Contrary to the flash point, the auto-ignition temperature decreases rapidly with increasing pressure. For example, an oil with an auto-ignition point of 700-750 F at atmospheric pressure will have an auto-ignition temperature of 400 F or less at 100 psi.

There are three general types of fire-resistant fluids.

1. Non-aqueous synthetic fluids composed of phosphate esters, chlorinated aromatics or combinations.

2. Aqueous synthetic fluids which

are water glycol mixtures compounded with various types of additives.

3. Oil-water emulsion fluids.

Although my company markets fluids covering all three general types, we recommend only phosphate ester lubricants for compressor oils—for reasons that are inherent in the operation of compressors. It is generally believed that water-based fluids cannot withstand the high temperatures encountered in air compressor cylinders.

In actual compressor practice, the Bury Compressor Company, Erie, Pa., ran substantial tests to compare the phosphate ester fluids with petroleum oils. These tests ran for periods of 100 to 250 hours during which no frictional heat buildup was observed and no corrosive tendencies were exhibited. Bury Compressor came to the conclusion that the phosphate ester fluid has excellent lubricity characteristics.

Tests for Flammability

There are many types of flammability tests which are distinctly different from each other because they attempt to simulate different types of hazard. For air compressor service the main hazard is auto-ignition, so let's look at the flammability tests which are applicable:

Autogenous-Ignition Test—This is a standard test which is run according to ASTM procedure D286. In this test a glass flask is heated in a solder bath. The test fluid is added to the flask, drop by drop, while heat is applied to the solder bath. No flames are allowed to contact the fluid or its vapors. The apparatus can be set up to permit temperatures as high as 1200 F. The auto-ignition point is reached when the test fluid bursts into flame.

Compression Ignition Test—Since the auto-ignition point decreases as pressure is increased it is necessary to test at high compression ratios. In one such test a small diesel engine is used to determine the compression ratio at which test fluids ignite spontaneously. The test is run according to a procedure outlined in Spec. MIL-H-19457 (Ships).

Piping Ignition Test—This is another method of determining auto-ignition point under pressure. In this test, the test fluid is placed in a dead end section of a piping system. Air at various pressures is released rapidly into the dead end chamber. At some high pressure the test fluid ignites. The test is run according to a procedure given in MIL-H-19457 Specification.

Molten Metal Test—Here we have no standard procedure but the test calls for pouring the test fluid on a bath of molten metal. The temperature of the bath can be closely controlled and no flames contact the test fluid.

Phosphate ester fluids have low servicing and maintenance cost but have higher installation expense. These fluids also require special packings and seals. Phosphate ester is incompatible with standard seals used with petroleum oil. Wherever there is contact between the lubricant and packing material—such as the lubricator, sump, moisture traps, etc.—butyl rubber packings should be inserted. Fortunately the air compressor itself generally uses, to a considerable degree, soft packing, metallic packing and vellumoid gaskets. These materials are impervious to phosphate ester fluid.

Intercoolers: Intercoolers are generally used in multistage air compressors. In units with long service, the air sides of the intercoolers are sometimes heavily coated with petroleum residues. Phosphate ester fluids in the air stream may lift these old deposits and the air stream will deliver these deposits to the next stage where they may jam rings and valves, interfere with operation of the air cylinders, or even result in wear or damage. In order to prevent this trouble, it is necessary to inspect the air side of the intercoolers and if deposits are heavy they should be cleaned out by caustic wash or strong solvent. In new compressors, lightly used and well maintained compressors, it is not necessary to clean the air side of the intercoolers.

Lubricators: Automatic force-feed lubricators are used in many types of air compressors. In this type of lubricator, the lubricant is contained in a small reservoir and is automatically pumped through sight-feed fluid indicators which visually show the lubrication rate to the various points on the air cylinders. These sight-feed indicators usually contain pure glycerine which is satisfactory for the phosphate esters. Any other sight-feed fluid such as a 50-50 mixture of glycerine and water is not satisfactory and the use of pure glycerine will be necessary.

Certain sight-feed indicators are of the floating piston type and contain no sight-feed fluid at all. These are also satisfactory for phosphate esters.

Lubrication Rate: A slightly higher lubrication feed rate is generally necessary for phosphate esters than is used for petroleum compressor lubricants. Initially, the lubrication rate should be set at twice the manufacturer's recommended rates for petroleum. After a few hours' operation, the compressor air cylinder should be opened and the cylinder walls and valves inspected for uniformity and amount of wetting. If an overwet condition is apparent, the rate can be cut back slightly. Over-lubrication is not a problem with this fluid since it is fire-resistant.

Moisture Traps: Considerable moisture is condensed during normal compressor operation, so care must be taken to insure that moisture traps on air lines between stages are functioning properly. This is a normal procedure with any type of lubricant. Moisture traps on air lines require no modification other than replacement of molded rubber components. Low pressure air systems, i.e., less than 250 psi, often use clear plastic bowls as part of filter and trap units. These must be changed to steel since clear plastics are attacked by phosphate ester fluid.

If the compressor is subjected to cold weather such as in an unheated location in wintertime, the lubricator sump should be heated to whatever temperature is necessary to prevent the viscosity index of the fluid decreasing to below 4000 SUS. The particular temperature will vary according to the fluid being used.

When all the various factors are considered — lubricity, safety and costs—the phosphate ester fluids are our only recommendation for compressor lubrication. These fluids are fire-resistant to the conditions normally associated with compressed air system explosions, and the difference in cost between petroleum oil and phosphate ester lubricants is a small price to pay for safety. **End**

Fig. 1 Over-all view of the 13 drums used for processing both aluminum and magnesium machined parts. Center drums are for pre-cleaning, drums, left, for anodizing, at right, for dichromate treatment of magnesium.

LOW COST METAL PROCESSING—WITH DRUMS

WHEN A SMALL, independent shop section at the Aircraft Division of Douglas Aircraft Company, Long Beach, California, needed its own metal parts processing facilities, plant engineers came promptly and economically to the rescue. Using thirteen 50-gallon drums instead of more costly processing tanks, twin processing facilities were soon set up —one for Alodine treatment of aluminum parts, the other for dichromate treatment of magnesium parts.

Two of the drums were purchased with the proper chemically resistant interior coating already applied. Ten drums with bare interiors for containing inert solutions and rinse water were obtained from salvage stock. The thirteenth drum is a commercially available barrel-type degreaser.

The drums were arranged around a lattice platform as shown in Fig. 1. Both aluminum and magnesium parts start their processing cycle at the center three drums, working toward the rear. The first center drum is the barrel-type degreaser, the second contains a soap solution, and the third a cold water rinse. This part of both processing cycles is the same.

The five drums at the left form the Alodine line and contain in turn (working forward) an acid dip, a cold rinse, the Alodine solution, a cold rinse and a hot rinse. The five drums at the right form the dichromate line and contain in turn (again working forward) the Dow No. 7 solution, a cold water rinse, sodium dichromate solution, a cold rinse and a hot rinse. When parts being processed reach the far end of the center line, they are transferred either left or right, depending upon whether they are aluminum or magnesium.

Fig. 2. Note the welded tripod-like sheet metal platforms on which drums are mounted to keep them off the often wet floor. Mixers, like the one in first drum, are also installed on three other drums in the line.

Plumbing which provides water for the various solutions is installed around the lattice platform. The drums used for rinsing are provided with surface drains so that continuous water changing occurs. Commercially available immersion-type heaters are used in solutions requiring heat. Electrically driven mixing paddles, Fig. 2, provide solution agitation when required. Conventional "warning type" pre-set timers are used for timing the various processing cycles.

Each of the drums sits on its own sheet metal platform to keep it off the often damp floor. These tripod-like platforms, Fig. 2, are of welded construction, and consist of a circular disc of sheet metal slightly larger than drum size, welded sheet metal uprights to keep the drum in place on the platform, and three short tripod legs of 4-in. iron pipe material.

Cross-barrel hangers with clamps are used for handling the parts through the various drums. Currently, a small anodic tank along with a small water deionizer are being added to this equipment. Parts intended for anodizing will be cleaned and rinsed in the drums already available.

When this anodic installation is completed, three distinct metal parts processing facilities — Alodine and anodic for aluminum and Dow No. 7 for magnesium—will be available on about the same amount of floor space required for one large processing tank, and at a cost that even the smallest independent shops can afford. **End**

STEEL, PLASTIC MIXTURE SPEEDS EQUIPMENT REPAIRS

A PRACTICAL APPROACH to the maintenance and repair of machines and tools through the use of a mixture of powdered steel and plastic has shown its effectiveness through various industrial applications. Made of 80 per cent steel and 20 per cent plastic, the material—called Plastic Steel—is available in either putty or liquid form.

In either form, the material becomes a tough metallic mass that can be drilled, tapped, or machined after mixture with a hardening agent. Reportedly, about two hours are required for setting time and shrinkage is held to 0.0005 in. per inch. Because of these qualities, both the liquid and putty types produced by Devcon Corporation have won wide acceptance, especially for emergency repairs and the production of short-run machine parts.

In actual field applications repairs were made to pumps, valves, broken castings on textile looms, stainless steel tanks, porcelain fittings, concrete sewer pipes, hydraulic cylinders, motor blocks, and hundreds of other types of equipment.

The following are a few brief case histories of the uses of pliable steel in solving repair problems:

Gas cooler. In Indianapolis some leakage developed in a steel gas cooler of the Citizens Gas and Coke Utility Company. Conventional repair techniques were both extremely expensive and time-consuming to stop it. But 12 lb of the putty type material patched the cooler. After nine months, the repair still had to show its first leak.

Water main. In Danvers, Massachusetts a main water line in the heart of town had cracked and was leaking badly, making it necessary to shut off the water supply to this pipe. To repair the break, the protective tar coating was burned away, and the surface cleaned. See Fig. 4. Then Devcon A (putty type) was applied over lead wool packing. In a matter of minutes the material had hardened; no leakage of any sort could be discerned after the water valve was opened.

Fig. 1. The first step in preparing the material is to add a hardener to the base ingredient, as in illustration.

Fig. 2. Second step, the two materials are thoroughly mixed before being applied to area which requires repair.

Bulk storage tank. A Gulf Oil Company tank, Fig. 5, leaked along the side and bottom. As a result, gases were escaping into the air, creating a fire hazard, and, of course, evapora-

Fig. 3. After mixing the material is then used as on the illustrated valve.

Fig. 4. The main water line in Danvers, Mass., was leaking badly. This was mended with putty type material.

Fig. 5. Gases were escaping from leaks along the side and bottom of tank; puttied material stopped them.

STEEL AND PLASTIC SPEED REPAIRS

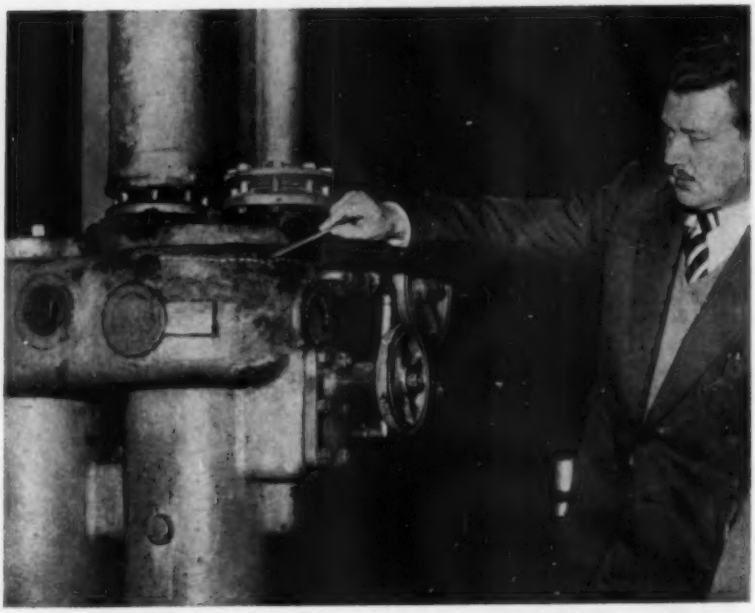


Fig. 6. This ammonia compressor had extensive fractures around cylinder casing. It was repaired at a cost of $11.20, subsequently returned to service.

tion losses were cutting down on revenue. After wire-brushing and thorough cleaning, repair material was troweled directly over the smaller leaks. For larger openings, wire mesh was placed over the leaks and the steel-containing mass applied over the wire.

Hydraulic cylinder. At Chrysler Corporation's Amplex Division cracks had developed in the base of a 48-in. diameter hydraulic cylinder in a 3000-ton press. The press was unable to operate. To solve this problem, the large piston was removed, revealing large holes and cracks. After removing oil and grease, Devcon B was used and ground flush after hardening. The press has operated successfully after reassembly with estimated savings amounting to $25,000 and a considerable reduction in downtime.

Compressor casing. A Johannesburg engineering firm, Race, Colly and Company, Ltd. repaired a brewery's ammonia compressor which had extensive fractures around the cylinder casing. See Fig. 6. Welding was questionable and a pound of each type of repair material was applied to the breaks with the consequent return of the equipment to service.

Besides its application in the repair of undesirable openings in metallic surfaces, the material may be used to repair stripped threads. After cleaning the threads, Devcon is forced into the hole. Then a new bolt which has been coated with a release agent is slowly advanced into the soft material. The bolt is left in contact with the Devcon until it hardens. Once removed, the bolt will have left new threads which are very strong. **End**

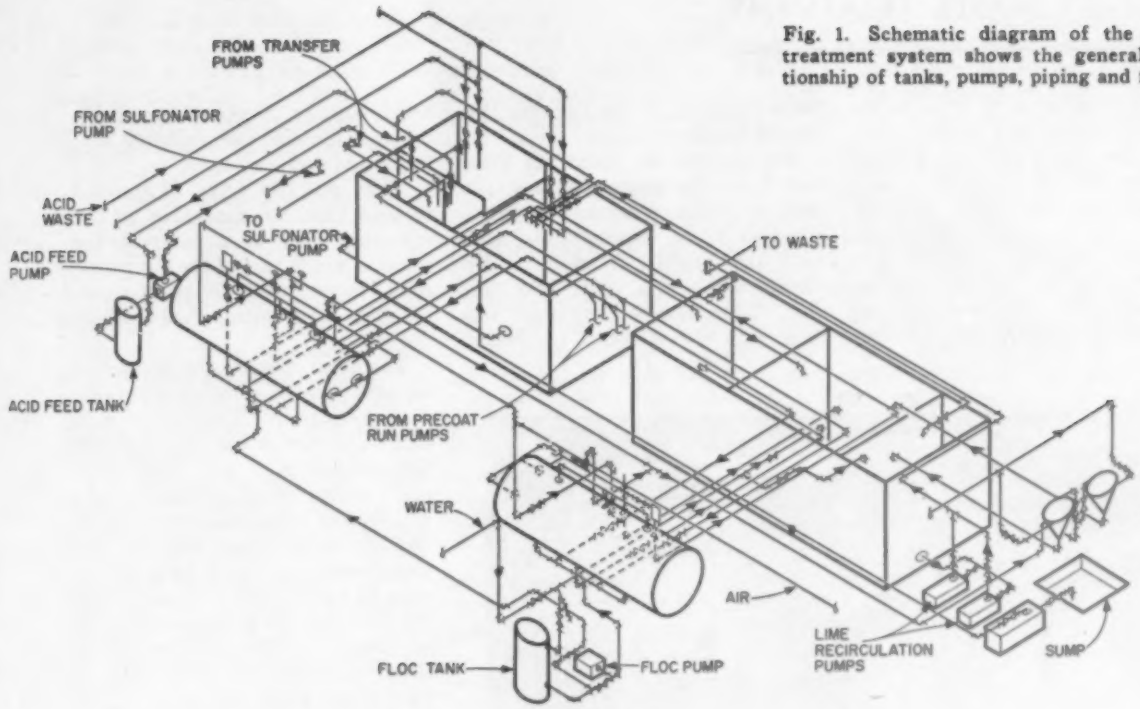


Fig. 1. Schematic diagram of the waste treatment system shows the general relationship of tanks, pumps, piping and filters.

COMPACT WASTE TREATMENT

System Gives Flexonics Plenty of "Scrubbing" Action

By **C. R. EKHOLM**, Project Engineer
Flexonics, Division of
Calumet & Hecla, Inc.
Bartlett, Illinois

CONSOLIDATION of six moderate-sized plants into one large plant minimized many operational and administrative problems in a business that involves production of from one piece to fifty thousand pieces per lot. Our production requirements range from items that may cost only a few cents each, some weighing less than one ounce, to a single item weighing up to seven and one-half tons at several thousand dollars each.

Virtually all items, during production, may become dirty, oxidized, or accumulate a surface condition that can detract from the operation or appearance of the finished product. The products or components of the products therefore must be cleaned, pickled or otherwise treated some time in their fabrication or prior to shipment.

Liquid cleaning and pickling operations involve a total of 30 tanks, including rinse tanks. These tanks are dumped at various time intervals, as waste, as they become spent. Of course the rinse tanks with constant waterflow represent, in volume, the far greater amount of contaminated waste water.

In the six original plants, the disposal of contaminated water posed no serious problems as there was sufficient water from other operations to effectively dilute the acid pickling wastes for acceptance by the local disposal systems and codes. One plant had a simple lime neutralizing basin that held the effluent for several hours with a simple lime neutralization prior to release to drain.

The new plant is in a small village where the waste water volume approximates that of the village. The waste water therefore must be of good quality for acceptance by the local sanitary disposal system. Waste water from other than pickling operations, is not available to aid in diluting the effluent from the new plant.

Such water is part of a semi-closed system, and is used to cool furnace jackets, welding transformers, welding torches, and other production functions that do not contaminate it. This water, in turn, flows through a cooling tower, surge tanks, etc., and is recirculated. One hundred and sixty gallons of water per minute is the present recirculated load.

The treatment and disposal of acids

and acid-contaminated rinse waters did not prove to be a difficult problem as there are several well-qualified designers and fabricators of suitable processes and equipment available. The decision as to the proper system compatible with this particular type of production and environment was very important. The selection and performance of the system was subject to approval of the Sanitary District of Greater Chicago.

We selected the Industrial Filter and Pump Company of Cicero, Illinois, to give us a turnkey operation for acid waste disposal. The acids used and disposed of are nitric, hydrofluoric, sulfuric, citric, and chromic. These can be neutralized with lime with the exception of chromic which must be converted from hexavalent to trivalent chrome before neutralization and disposal.

There are two types of disposal systems that are applicable to our operation. One is a sedimentation setup in which part of the equipment can be housed within the plant or outbuilding, the remainder being out-of-doors.

The other system, the one which we have chosen, is the pressure continuous-treatment filter type; it is entirely housed in our building. This has resulted in a very neat, compact facility which eliminates yard clutter, and maintenance and service problems in inclement weather. The filter system process is basically the same as a sedimentation system up to the retention and sedimentation pond or basin. At this stage we use large filters to remove the solids from the neutralized waste fluid.

The first step in the treatment is to accumulate the acids and rinse wastes in an equalizing basin. This serves as an interim holding surge tank to assure a more constant flow into the neutralizing basin and is a blending area for the various acids and rinse waters. This blending assures a more constant pH of the media going to the neutralizing basin. Alkali wastes from production are also accumulated here and have a neutralizing effect on the acid constituents.

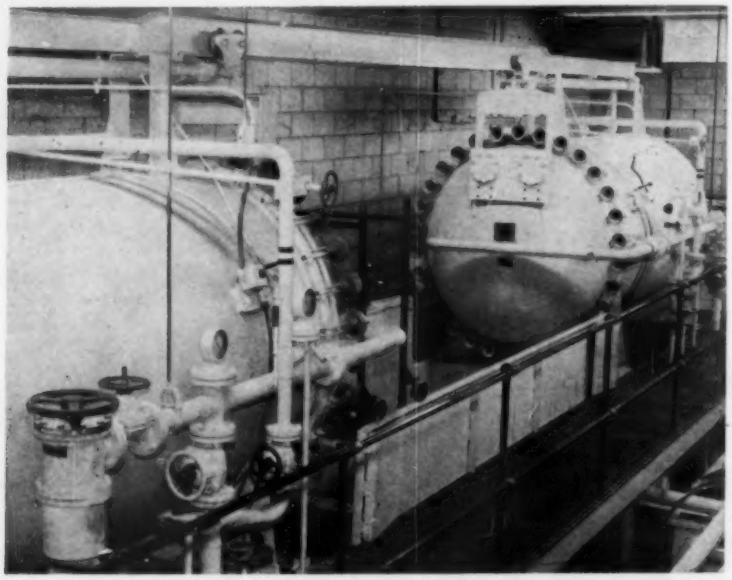


Fig. 2. Monorail section located above the two filters is used to move out the head covers. Such removal is also simplified by incorporating handwheels with the swing bolts around the facing ends of the filter housings.

Fig. 3. This is how the filter element looks after seeing service in the system. The caked material is dried with compressed and room air; and removed prior to filter use.

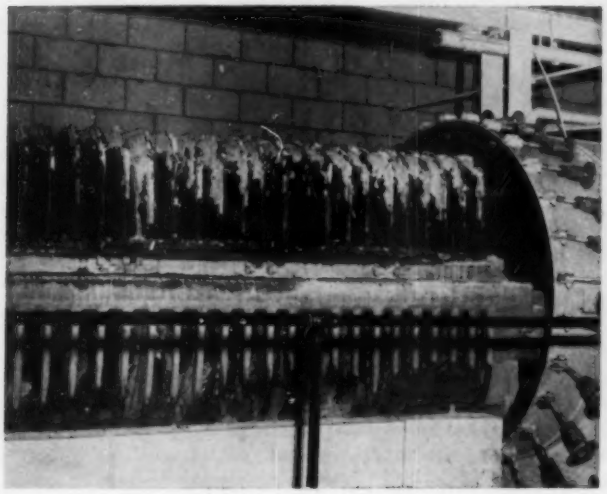
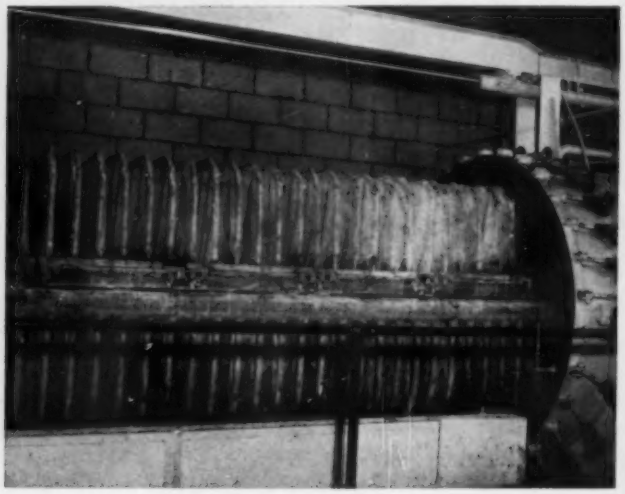


Fig. 4. Here is how the filter element looks after it is cleaned. It is now ready to be returned to the housing for coating with some pumped diatomaceous earth slurry.



Flow is next diverted to the neutralizing basin where a lime slurry is added in varying amounts. The tank contents are kept in constant agitation by a powered mixer. The neutralized fluid is then transferred by a pump to an interim holding or surge basin called the filter sump. The treated liquid which now has a light muddy appearance, is pumped to the filters for removal of the solids.

Bagged lime is dumped manually. The slurry mixer receiving the lime is of conical shape with water entering the upper part on a tangent, the lime being fed at the open top. After mixing, slurry goes to a basin for use in the treatment.

The horizontally-mounted filters are 6.5 ft in diameter by 13.5 ft long, closed on one end with a removable cover on the other. The cover is clamped to the filter body by 30 hold-down swing bolts with combination handwheel capstan nuts to speed opening and closing of the filter. See Fig. 2.

Each of the two heavy covers is hung on a monorail and trolley for ease of handling in opening the filter. Our two filters have the open ends facing each other 14 ft apart and share the same monorail.

Filter plates are square in shape and of light thickness, the main area being a metal mesh mounted in a supporting tubular frame. See Figs. 3 & 4. This assembly is covered with a cloth bag. The plates have a fitting at the bottom to connect all the plates to a common drain header.

Waste Fluid Flow

Waste fluid to be filtered enters the filter, flows through the cloth under pressure, and goes through the plates. To oppose the pressure metal mesh serves to support and separate the two sides of the cloth bag which allows the liquid to drain down the inside of the bag through the bottom fitting. To make the plate and cloth more effective as a filter it is partially clogged or precoated with a diatomaceous cake.

A separate tank with a powered mixer is needed for making a slurry of water and the earth which is pumped into the closed filter. See Fig. 5. The diatomaceous earth and water slurry facility is identical to the lime setup. The water passes through the plates, the earth is filtered out or retained on both sides of the plate as a coating or cake, up to possibly ½ in. thick. After the precoat, the waste liquid to be filtered is pumped into the filter, the solids being held back and retained by the precoat or cake. The waste-liquid flow through the filter must be constant to assure retention of the cake on the plates.

If there is not enough acid waste to be treated, the effluent is diverted to the filter sump and recirculated to retain the cake rather than go to the drain. A polymer flocculent is metered into the filters to enhance particle entrapment.

The filter ultimately becomes loaded with solids and must be cleaned. One filter is taken off the line while the other is in operation. Shop air is blown through the filter for 15 minutes to dry the cake and solids on the filter plates. The cover is opened far enough to expose the plates. We, at this point, leave it open over night to further dry the cake, and by morning the cake is crazed and much of it has fallen off the filter plates.

Filters are seven feet above the floor to allow the cake and sludge to drop into a hopper and down into sludge buggies. The cake can further be removed with shop air and with a wooden paddle.

The residue is a dry cake or dry sludge and is readily handled compared to the wet sediment or sludge of the sedimentation method. The sludge is dumped from the buggies into trucks and hauled away by a commercial scavenger.

Complete installation occupies an area of 20 ft by 60 ft plus 16 ft for a very complete control panel and interim lime-bag storage. The control panel, Fig. 6, has pH indicators, and recorders for continuous readings, level controllers, clock, and an alarm for high and low pH in the final neutralization basin; it also has alarms relating to the chrome reaction basin, for low pressure in the sulfur dioxide supply and high and low level in the filter sump. Besides, the panel houses the start-stop stations for mixers, and pumps.

Acids and rinse waters are pumped through overhead Saran-lined pipe from two remote areas; flow from a third area is diverted to trenches and underfloor pipe into a common sump in the acid disposal room.

One of the main advantages of the filter system is the quality and clarity of the effluent which is now going to drain. We are shortly going to divert this water back to our rinse tanks for reuse and also to use as makeup in our secondary water system. Additionally, there is the advantage of the dry cake, along with a compact installation out of the weather for easier operation and maintenance. **End**

Fig. 5. Lime and diatomaceous earth are manually fed to the hoppers. Water enters tangentially for mixing.

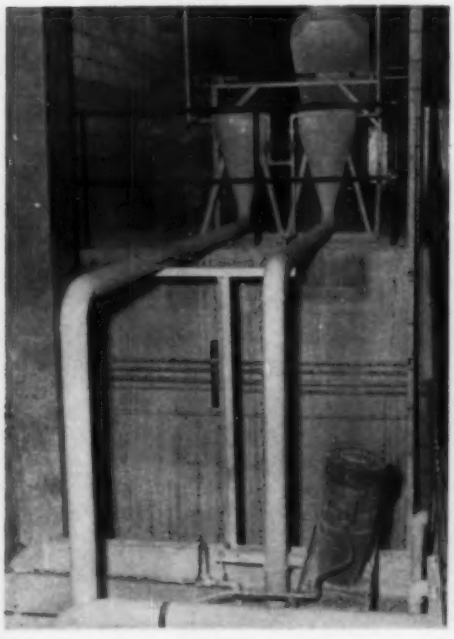
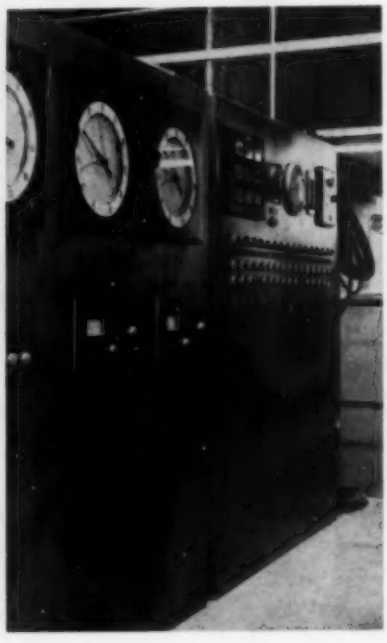


Fig. 6. Monitoring of activities of waste treatment system is made possible by these indicators, recorders.



PORTABLE BOILERS SUIT MONSANTO'S MULTI-PLANT STEAM NEEDS

TO KEEP PACE with production demands that change with the world's buying habits, the Plastics Division of Monsanto Chemical Company is developing a network of portable packaged steam generators. Most of the boilers are installed outdoors and can be moved easily from plant to plant on railroad flatcars.

"Portability is one of the key factors to consider in providing steam today," says Alfred G. Payne, Manager of Design at Monsanto's Plastics Division in Springfield, Massachusetts, where three packaged units are now in use. "It's economically valuable to be able to shift boilers from one plant to another as production needs change."

"Eventually," he adds, "for utmost portability, we may be using packaged boilers attached to flatcars so we can move them on short notice when a need arises."

Besides portability, packaged boilers afford economy in themselves, Payne points out. Analysis made by Monsanto engineers show packaged unit steam plant cost is about $4.50 per pound of steam per hour capacity —compared with about $10 for field-erected generators.

Monsanto first went into packaged boilers in 1952 when two 25,000-pound-per-hour units were installed in its newly-built Avon, California, plant. Portability was not an important factor then, but its value became apparent just a few months after the Avon plant was opened.

Steam could be purchased from a neighboring industrial plant for less than it cost to generate it. So, two boilers at Avon were kept in standby service until last year when steam was needed in two other plants.

Then one was taken to the Seattle, Washington, plant. But to meet the need for additional steam at the Long Beach, California, plant another 25,000-lb unit was purchased.

The other boiler at Avon was kept

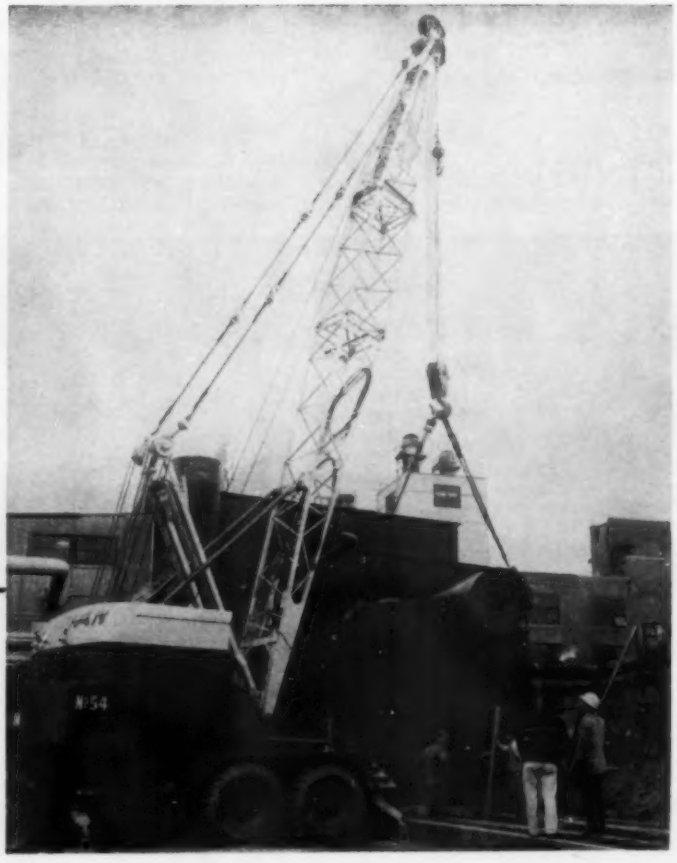


Fig. 1. Mobile crane, and timber supports and logs were utilized in moving boiler from flatcar to the shelter.

as a spare—ready to serve any of the three West Coast plants in the event their boilers failed or required extensive repairs.

In the East, Monsanto's first packaged boiler was installed at the Springfield plant in 1955. And it served as the basis for the cost analysis that sold the company on packaged units for economy in operation and portability.

The boiler in Springfield, a 45,000-lb unit, was intended to supplement two 110,000-lb and three 30,000-lb field-erected boilers. The boiler was located near a major steam user, remote from the existing steam plant, and connected to an existing service main.

A year later an identical unit was added at Springfield. This time, with the value of packaged boilers more firmly established by the company's cost analysis, the plant was made more reliable. Better facilities were built for firemen and some auxiliary equipment was added for greater reliability.

The capital cost of the boilers then was figured at $2.25 a pound per hour—compared with the $10 cost for the previous field-erected units. But today, Payne observes, increased costs of manpower and materials plus still more auxiliaries for reliability have boosted the figure to $4.50.

Here's how the cost breaks down: Purchase of machinery and equipment with packaged units is figured at about $2.70 a pound per hour with the remaining $1.80 for installation. With field-erected types, purchase is about half the $10 figure and installation the other half.

Cost of operating both units is about the same, Payne reports. "Coal-burning field-erected boilers generally offer lower fuel costs in Springfield, Massachusetts, although packaged units can be converted easily from gas to oil and vice versa to keep up with seasonal changes in fuel price or regional economies when the units are transferred. But reduced manpower costs and the lower investment for packaged boilers put them on a par with the others in operating economy."

Packaged boilers have been found economically attractive in plants requiring very large quantities of steam; steam in hundreds of thousands of pounds per hour and at pressures as high as 600 psig. Three 80,000-pounds-per-hour, 600-lb units were installed in the Texas City plant during the past three years to supplement existing field-erected units having a total capacity of about 1,000,000 pounds per hour.

A typical case history on the flexibility of packaged boilers is the story of a 42,000-pound-per-hour unit purchased in 1957 to provide a temporary source of steam during a construction project at a plant in New Jersey. On completion of that project, the boiler was shipped to the Springfield plant in 1958 where it was held as a spare until 1960. Then it was shipped to the Cincinnati plant.

Packaged units have been put in other Monsanto plants. At the general headquarters in St. Louis there are three 30,000-lb boilers. There, however, they have been placed indoors for appearance sake.

A relatively new development which simplifies connecting packaged boilers into existing steam pipe systems is a "pressure tapping" device, whereby a valved tee is installed in a pipeline without having to shut off the flow of steam. The two most recent packaged boilers at Springfield were brought on stream by this method without any interruption to the steam supply.

In general, Payne points out, "the packaged boiler has become a real asset to steam production in our company in the last 10 years. And we hope in the next 10 to utilize more fully the advantages it affords—perhaps even for power production; but surely the portability factor." **End**

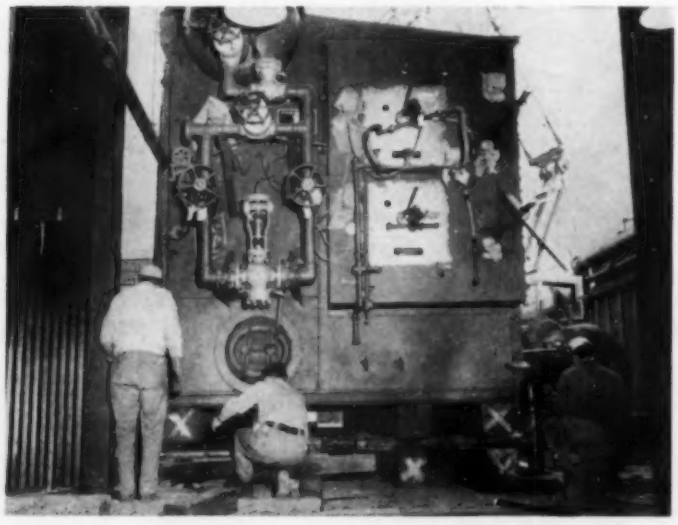


Fig. 2. At this stage, packaged boiler sits just outside opening of structure from which it supplies plant steam.

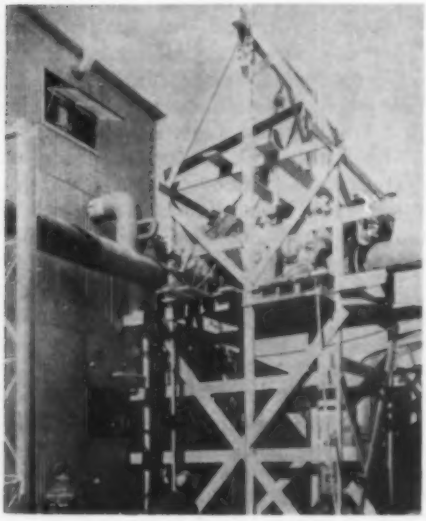


Fig. 3. "Pressure tapping" rig on the scaffolding was used to tie boiler's steam supply line with a service main.

B. GENERAL WORK—PART VI ROOFING, INSULATION, DAMPPROOFING

CONSTRUCTION SPECIFICATIONS

By R. E. WALLIN, Chief Engineer, Construction, Plant Engineering Dept.
Joseph T. Ryerson & Son, Inc., Chicago, Ill.

ROOFING, INSULATION, DAMPPROOFING

SCOPE. The work included under this contract heading would be: to provide and install vapor-seal membrane, insulation, and roofing for all roofs; insulation for foundation walls; dampproofing on first-story subfloors; waterproofing in second-story shower rooms; and insulation in connection with expansion joint plates between office and warehouse buildings; all in accordance with the drawings and as specified.

EXAMINATION BEFORE INSTALLATION. It is urgent that the contractor examine all roof and subfloor surfaces on which his work is to be applied before commencing work. His proceeding with the installation of either vapor-seal, insulation, roofing materials, or dampproofing will be considered an acceptance by him of the surfaces to be worked upon and he becomes responsible for an acceptable job.

FIRE RETARDANT VAPOR BARRIER. Since the sad experience of the Livonia, Michigan fire some years ago, much thought and time has been spent by insurance and construction people to find a way to solve, economically and practically, the problem of fire where steel roof deck is used.

One method was to reduce the amount of roofing tar in materials in contact with the steel deck; another was to use only noncombustible or fire retardant insulation.

We outline below one method of reducing inflammable materials in roof construction, which has been approved by a fire insurance inspection group.

This method calls for the installation—directly on the steel decking—of an over-all fire retardant, vapor-barrier membrane. This membrane material is supplied in 32-in.-wide rolls. The adhesive for installation shall be one recommended by the manufacturer of the membrane.

First, the steel deck surfaces are coated with adhesive, using a pouring can, and spreading the adhesive with a roller coater. Lay and roll out the membrane so it will be embedded in the adhesive. Side and end laps shall be at least two inches, and each lap shall be fully sealed with adhesive. At wall sides of roof, extend membrane not less than two inches above cants. Apply only that amount of membrane which can be covered with insulation and roofing the same day.

ROOF INSULATION. Insulation for all roofs should be specified as noncombustible, rigid board as manufactured by a reputable company. The roof insulation board generally used is in two 1-in.-thick layers for office buildings and one 1-in.-thick layer for plant buildings with inside temperature under 60 F, in board size of approximately 2 ft by 4 ft.

Install insulation over the membrane. Lay insulation board in the same adhesive used for the vapor-barrier membrane, applied in either straight or serpentine pattern, using a pouring can or spreader.

Good practice calls for the courses of the insulation board to be so arranged that upper layer joints will break with those of the lower. All cutting of units as required for complete roof coverage should be done as required. Follow application of the vapor-seal membrane closely with the insulation.

Large roofs should be divided by water cutoffs. At water cutoffs of the roof area, as shown in the drawing, and at cutoffs made at the end of each day's work, apply vapor-barrier membrane with adhesive, extended 4 in. on membrane applied to the deck and 6 in. on top of insulation. Cutoffs should be tightly sealed.

ROOFING MATERIALS. Roofing liquids are called tar, pitch, asphalt, etc. So as to avoid confusion, it is a good idea to clarify by saying: In the following, wherever the word "pitch" is used, it shall be understood to mean roofers' tar, roofers' asphalt, or roofers' steep asphalt of the kind and quality recommended by the manufacturer for use on their felts or fabrics and in locations where such felts or fabrics are used.

For our typical job, we say that the roofing should be four-ply, "tar and gravel" construction on all roofs, except main entrance roof and storm vestibule (which shall be four-ply, smooth asbestos felt without insulation), of best quality materials.

Felts are generally specified as standard 15-pound saturated rag or asbestos felt in 36-in.-width rolls. There is also fiber-glass felt on the market.

Pitch should be of best quality as made by reputable approved manufacturers. No synthetic or "bitumen" pitches shall be used.

Generally gravel is specified as durable, clean, water-

Insulation is laid over vapor seal on steel roof deck before applying pitch, felts and gravel to form built-up roof.

worn, dry roofer's gravel, or roofer's slag, as approved by the engineer. Crushed stone and white marble have been used.

ROOFING INSTALLATION. Architects and engineers will outline the quantities of materials which should be used to provide the roofing they want. To illustrate, on our typical job, we will say:

The tar and gravel roofing shall be built up to consist of not less than the following quantities of materials per square (100 square feet) of roof area:

4 moppings of tar under felts	100 lb
4 layers of roofing felt	60
1 flood top coating of tar	50
gravel	400
Total	610 lb

The smooth roofing shall be built up the same as tar and gravel, except gravel shall be omitted.

None of the roofing work should be started until drains, roof ventilators, gravel stops, curbs, vent stacks, and mopped-in flashings are in place. The roofing should always closely follow the installation of insulation so as not to leave insulation unprotected at any time.

Good workmanship requires that felts be applied over the insulation, laid in shingle method, lapping each run 27½ in. over the run immediately below, with full moppings on the top of insulation and between felts so that in no place shall felt touch felt.

Generally, pitch is applied at a temperature of 375 F, more or less, and should never be heated above 425 F.

Each layer of felt should be rolled into the hot mopping and broomed to expel all air from under each sheet and provide complete and continuous adhesion.

Ends of strips of felt normally are lapped not less than 4 in. and mopped down, and laps shall not be made closer than 2 ft to the next closest end lap.

All layers of felt and moppings should be extended up to the top of the cant strips and nailed at top of cant strips with roofing nails through 1-in. flat tin discs.

Base flashing should be provided at roof joinings with

Photo courtesy National Gypsum Co.

Typical installation of roll roofing on a flat roof. Each layer is lapped, and mopping of tar between each pass insures that seal is complete. Brooming expels air bubbles.

vertical walls. Where vertical walls are masonry, apply a primer coat.

On our typical job we also specify that on the vertical walls of the warehouses, from a line at the top of the cap angle forming the parapet (above the cant strips), there should be mopped on three plies of a reinforcing felt, which should extend down over cants and onto the deck roofing, each ply to extend about 1 in. beyond the one immediately below. Over these three plies and completely covering them should then be mopped on a strip of 90-lb mineral-surfaced prepared roofing with ends well lapped and mopped. Vertical walls of office building should be similarly flashed.

After the above work is completed, then the entire roof surfaces (except on prepared roofing of base flashing and on smooth roofing) are to be flood-coated with pitch, evenly and uniformly applied and into which, while hot, shall be embedded dry roofers' gravel.

FOUNDATION INSULATION. It has been definitely established that below-ground perimeter insulation pays for itself in occupant comfort and fuel savings, especially so when the lower story is directly on the solid ground.

Since our typical job is like this, we say that on the inner sides of the office building foundation walls, as shown on the plans, lay insulation in one 2 in. thickness, in units of about 3 ft by 4 ft in size. Fit materials tightly into corners and around projections.

Attach this insulation to concrete walls, with spot moppings recommended by the manufacturer.

Rigid insulation board is laid in one-inch-thick layers, with joints of top layer staggered to prevent lineup with joints in bottom layer. Joints are filled for better seal.

DAMPPROOFING. It has also been found that where a lower floor of concrete is laid on solid ground, it pays to put a layer of dampproofing between the structural floor laid on the ground and the lightweight aggregate topping into which is laid floor duct, conduit, and other piping. For this we say that a dampproofing membrane shall be installed in all first-story areas of the office building, except in the main entrance vestibule, the stairway, and the boiler room, applied to the concrete subfloor slab. Lay a two-ply membrane, using felts and tar, as specified for roofing. Lay felt in full moppings applied to the concrete and between felts. Lay felts in shingle method, lapping strips to obtain two plies at all places. Mop the entire top surfaces of the felts with a 25-lb mopping of pitch. This dampproofing work shall not be done until just previous to the laying of floor duct and similar work prior to the pouring of the upper layer of concrete floor.

A waterproofing membrane should always be laid under the finished floors in shower room areas, applied to the concrete subfloor slab. Lay this as a four-ply membrane in same manner as specified above for two-ply work. Reinforce vertical and horizontal corners with saturated fabric between third and fourth plies of felt.

It is very important that the surfaces of the floor and walls be clean and that a primer coat be applied over all surfaces before applying membranes.

GUARANTEE. Contractors feature roofs bonded for 20 years, 30 years, and other periods, and when so bought they furnish a bond form properly filled out and signed. The owner pays so much a square for these bonds, and this cost is over and above the cost of laying the roofing.

A good roofing job is one of the most important parts of a building and is only as good as the workmanship of the contractor that applies it and the materials he uses. Therefore, it is most important when buying a roofing job to: first, specify a good roof; second, select the best contractor available; and third, have him use the best materials obtainable.

Generally, if anything is going to happen to a roofing job, it will occur within a reasonable time after application. It is, therefore, advisable to require that the contractor agree to make all necessary repairs due to defective materials and/or workmanship for a period of two years without any cost to the owner. All necessary work during the period of the two-year guarantee shall be made within a reasonable time after a written notice has been delivered by the owner to him. **End, Part VI**

SAVED—
100 MILLION GALLONS OF WATER

Aftercooler Cuts Costs of Generating Atmosphere Gas

By A. M. BEEBEE, JR., Plant Engineer
Rochester Products Div.
Gen'l. Motors Corp., Rochester, N.Y

IN RECENT MONTHS there has been increasing emphasis on the part of management to seek out and effect reduction in the cost of utilities. This action is the result of a twofold interest—competition and a genuine interest in conservation of natural resources. Increased mechanization and utility rate increases are causing utility costs to become a larger portion of total costs—as high as 10 to 20 per cent of labor costs in many manufacturing industries.

Traditionally the assignment of utility service in industry has been borne by the plant engineer. This is true at the Rochester Products Division of General Motors where the plant engineer is general chairman of a utility conservation committee, which meets monthly. This committee is composed of sub-chairmen, each of whom is responsible for one of the utilities.

The main committee reviews progress toward goals, establishes training programs for general plant use to generate utility conservation interests in all areas, provides for passing information freely between sub-committee chairmen, since our experience has been that all utilities are closely allied and, in addition, makes specific assignments to sub-committee chairmen.

Since the total cost of utility conservation is so extensive there is a continuous challenge to seek an efficient use and to reduce where possible the costs. Because of this, rewards for effort are particularly attractive.

One of the utilities not generally associated with plant engineering is atmosphere gas generation and distribution, which has extensive use in the metal forming industries. This service is not only closely allied to the basic concept of other more generally accepted utilities, like electricity, water and gas, but it is also a large consumer of these utilities.

Perhaps the first question which comes to mind is "Why do we have this gas?", and "What is it?"

The "why" is relatively simple. In order to anneal steel and still retain a bright finish or to perform copper brazing operations, it is necessary to have a completely inert surrounding atmosphere, free of moisture, oxygen and other substances that might affect the quality of the work. The gas which we manufacture is such an atmosphere.

"What is it?" Specifically, it is a gas composed of 13 per cent hydrogen, 10 per cent carbon monoxide and 4 per cent carbon dioxide, with nitrogen making up the remainder. The gas is obtained by a controlled chemical reaction. Natural gas has two main ingredients in its chemical structure, carbon and hydrogen. When natural gas is burned, various results can be obtained, depending upon the conditions surrounding the reaction.

Products of the reaction are in varying amounts of the following compounds and elements, carbon, hydrogen, carbon dioxide, carbon monoxide and water vapor. Of these five

Fig. 1. Diagrammatic detail of the components involved in an exothermic gas generator being used at our plant.

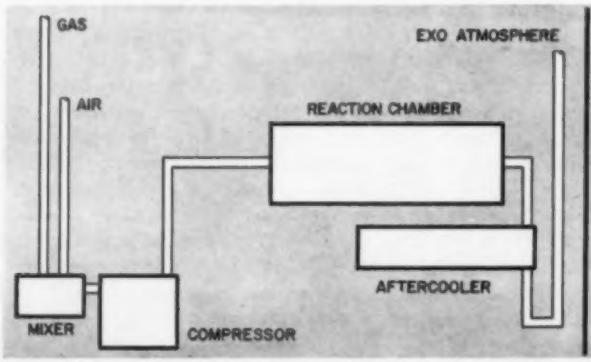
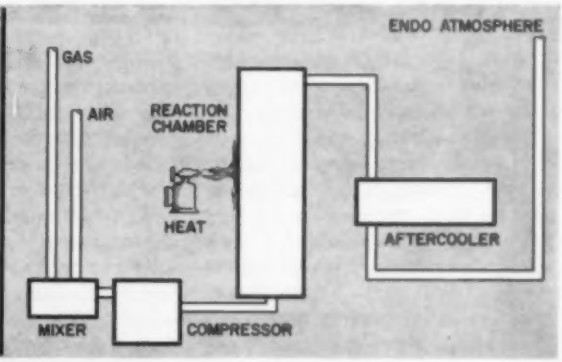


Fig. 2. Components for the endothermic generator are quite similar but heat is added at the reaction chamber.



products some are more desirable than others. For example: carbon monoxide and hydrogen. It has been found that burning natural gas with a limited amount of combustion air will produce varying amounts of CO and H_2, depending on the mixture. Ratios of 10.3:1 (air to gas) will produce complete combustion. Ratios of 5:1 will produce a composition with up to 15 per cent H_2, 10 per cent CO. CO_2 varies from 12 per cent to 5 per cent.

Over this entire range of ratios the reaction is sustained, that is to say, the gas will burn and give off some heat. This characteristic gives the gas its name exo (exothermic) or giving out of heat because of the reaction. See Fig. 1 for typical exo gas generator details.

As the ratio of air to gas is lowered to 3.5:1 the analysis can go to 28 per cent H_2, 17 per cent CO and 2 per cent CO_2. As it is further lowered to 2.4:1 the analysis could be 38 per cent H_2, 20 per cent CO and no CO_2, with possible traces of methane from the original natural gas. These reactions have so little air that they cannot support their own combustion and external heat must be supplied to sustain and control the reaction, hence the name endo (endothermic), or heat added. See Fig. 2 for details of the endo gas generator construction. Because more gas is used per unit volume and because of the fact that heat must be added to the reaction chamber, we have found it costs about three times more to generate endo gas, volume for volume.

Endo gas has specific advantages in spite of this increased cost because of its high percentage of hydrogen and carbon monoxide. These can be utilized as highly reducing agents and this composition can be used to enrich the leaner exo gas when required by certain types of equipment. This enriching is generally found to be necessary where large amounts of oxygen in the process must be reduced.

Frequently, and as was the case at Rochester Products Division, the atmosphere is used in furnaces where relatively large openings are required for process considerations. Such openings are necessary just to get the work in and out of the furnace. These furnace openings provide easy access for oxygen to enter the furnace and

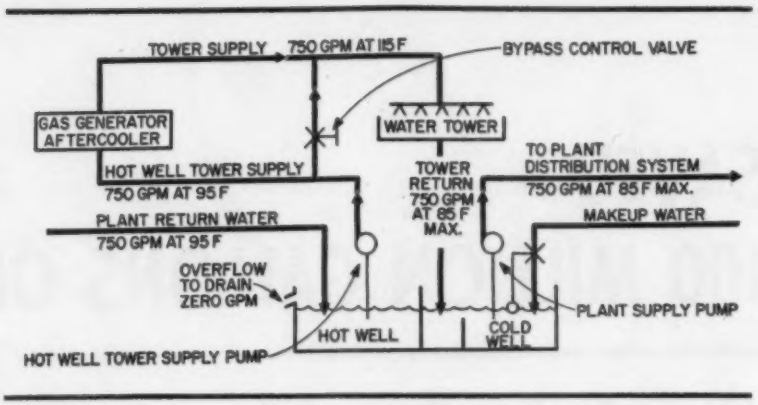

TOWER SUPPLY 750 GPM AT 115 F
BYPASS CONTROL VALVE
GAS GENERATOR AFTERCOOLER
WATER TOWER
TO PLANT DISTRIBUTION SYSTEM
750 GPM AT 85 F MAX.
HOT WELL TOWER SUPPLY
750 GPM AT 95 F
TOWER RETURN 750 GPM AT 85 F MAX.
MAKEUP WATER
PLANT RETURN WATER
750 GPM AT 95 F
OVERFLOW TO DRAIN ZERO GPM
PLANT SUPPLY PUMP
HOT WELL
COLD WELL
HOT WELL TOWER SUPPLY PUMP

Fig. 3. In system, hot well water is pumped through aftercooler heat exchanger, increasing temperature to 115, then to water tower and plant system.

under these conditions excessive water vapor left in the mixture is detrimental to the steel heat treating process because of the oxidizing characteristics of the water vapor. This undesirable water vapor is generally reduced by using a conventional shell and tube heat exchanger to reduce the dew point of the resulting mixture to acceptable limits.

Rochester Products Division was using approximately one hundred million gallons of 70 F purchased city water each year for this dew point control. Even at this temperature, sufficient quantities of water vapor remained so that the oxidizing characteristics had to be overcome by adding quantities of enriching endo gas.

Features of System

Economies to be achieved by capturing the potential water savings were most attractive. However, the application of reclaimed water to the heat exchanger for dew point control incorporating heat release by cooling towers dictated an even higher dew point, since the temperature limit for reclaimed water in the summer time is in the area of 85 F. This fact was encouraging to the development, design and installation of a direct expansion aftercooler, that could be relied upon to maintain a 40 degree dew point.

The chiller itself is a large box having suitable pipe connections. On the inlet and outlet sides there is a baffle which consists of a bed of Raschig saddles. These are designed to give a very even flow across the refrigeration coils, which are in the center section. Gas enters, is distributed in the first bed of saddles, and passes over the coil where it is cooled from 120 to 40 F. Due to the psychometric relations of water and gases, this cooling causes water droplets to form in a fine fog. As the gas passes through the second bed of saddles, this water is scrubbed out and is removed through a drain line.

In this installation, the load applicable to the new apparatus was reduced by continuing to utilize the existing shell and tube heat exchanger to bring the gas temperature to the generator from approximately 2000 to 120 F. This could be done conventionally by using reclaim water from cooling towers, but since the available supply system was already being used to volume capacity, additional capital pumping systems and facilities would have been required.

Inasmuch as most of the water in the reclaim system was being used for hydraulic oil cooling, the restrictions on upper limit temperatures for hydraulic oil dictated that return water to the hot well could not exceed 95 F. This meant that a large part of the capacity of the cooling tower designed for 115 F water inlet temperature was not being used. A piping system, Fig. 3, was designed where the hot well tower supply pumps were used to push water through the aftercooler heat exchanger, increasing its temperature from 95 to 115 F and thence to the tower to utilize the unused capacity. The obvious advantage to such a proposal is that no additional facilities were necessary to make this system function.

(Continued on page 208)

DEPARTMENT OF DEFENSE AIPE CHAPTER ORGANIZED

Officers of the newly-organized Department of Defense Chapter are, l to r: D. Snell, vice president; Col. H. J. Stehling, president; Maj. C. Weidner, secretary-treas.; and T. J. Buntin, Membership Committee Chairman.

ON AUGUST 18, members of the Army, Navy and Air Force attended a meeting in Washington, D. C., to organize a local chapter of the American Institute of Plant Engineers.

This organization is composed of personnel from the Army's Corps of Engineers, the Navy's Bureau of Yards and Docks and the Air Force's Directorate of Civil Engineering, who are responsible for the operation and maintenance of the Armed Force's plant facilities.

Colonel Henry J. Stehling, Chief of the Base Maintenance Division, Directorate of Civil Engineering, USAF, was elected president; Mr. Dale F. Snell, Chief Utilities Branch, Corps of Engineers, was named vice president; and Major Cecil J. Weidner, Base Maintenance Division, Directorate of Civil Engineering, USAF, secretary-treasurer. Mr. Thomas J. Buntin will serve as Chairman of the Membership Committee.

The chapter was approved by the National Executive Committee of the American Institute of Plant Engineers at their quarterly meeting in Greensboro, N.C., on September 11, and will be known as the Department of Defense Chapter Number 60.

Other Chapter Activities

Dallas Chapter

Bob Butler, plant engineer of Texas Instruments Central Research Laboratories, and vice president of the Dallas Chapter, recently returned from vacation to find

One transfer and three new applicants present membership forms to Bob Butler, vice president Dallas Chapter. L to r are: H. Grundy, R. Bucy, G. Summers, C. Baldwin.

Members of the Greater Pittsburgh Chapter arranged a plant tour of the Research Center laboratories and shops of the Neville Chemical Company earlier this year.

one transfer and five new applicants from within Texas Instruments for membership in the Dallas Chapter.

First in line, in the photograph, is Charlie Baldwin, former vice president of the Potomac Chapter and now Engineering Supervisor of Technical Facilities and Operations Engineering, TI. He is followed by the new applicants—Garth Summers, Engineer-in-Charge of Ventilation and Air Conditioning; Bob Bucy, Engineer-in-Charge of Electrical Distribution; and Howard Grundy, Engineer-in-Charge of Liquid Systems.

Two other applicants, Ray Mott, Administrative Engineer, and George Houston, Engineer-in-Charge of Gases, were not around to get in the picture.

New York-Long Island Chapter

This newly formed chapter, which is an offshoot of the former New York Chapter, has elected the following officers:

T. E. Heasley, Jr., of Reeves Instrument Corporation, president; W. T. Landry, General Bronze Corp., vice president; S. J. Fuchs, Kollsman Instrument, secretary-treasurer; and R. J. Seitz, Chas. Pfizer & Co., Inc., national delegate.

Committee members also appointed are: W. T. Landry, membership; W. V. Roll, of Ideal Toy Corporation, publicity; and J. J. Darling, Crown Chemical Company, programing.

Monthly meetings are held on the second Tuesday of the month. Those wishing to apply for membership in this chapter, should contact Sheldon J. Fuchs, Kollsman Instrument Corporation, 80-08 45th Ave., Elmhurst 73, New York. **End**

SWITCH NOW AND SAVE THE DIFFERENCE

Here's how changing from copper to Rome's aluminum TW building wire can improve your profit picture

The figures in the table tell the story. An installation using *aluminum instead of copper building wire usually costs less.* Savings on wire cost vary with size, as indicated in the table. Simply select the size and multiply the difference in cost by the amount of wire required. It follows, too, that the more times you use aluminum, the more you save. And don't forget, lightweight aluminum is easy to handle. For example, 1000 feet of No. 1 AWG copper Type TW weighs 115 lbs. more than aluminum wire of equivalent current-carrying capacity. Those are pounds you *don't* load, unload or carry. The savings in dollars are obvious. And you'll appreciate the ease of handling with the first installation—and every one that follows. For the full story on Rome Aluminum TW wire, contact your nearby Rome distributor or sales representative. Or, write to Rome Cable Division of Alcoa, Dept. 5-111, Rome, N. Y.

ROME CABLE CORPORATION | 10 AL TW 600V MOIST RESIST

Rome Synthinol Type TW with aluminum conductor is available in a full range of sizes starting with #6 AWG. Underwriters' Laboratories approved. The insulation, a thermoplastic compound, is flame-resistant, oilproof, easy to pull, free-stripping and has extremely high dielectric strength.

ALCOA
ROME CABLE
DIVISION

Circle 564 on postcard, page 33

ROME SYNTHINOL BUILDING WIRE

TYPE TW – 600 VOLTS

Underwriters' Approved

COPPER			ALUMINUM			SAVINGS	
SIZE	NO. OF STRANDS	LIST PRICE	SIZE	NO. OF STRANDS	LIST PRICE	DOLLARS	PERCENTAGE (Approx.)
6	7	$ 67.30	4	7	$ 54.10	$ 13.20	20%
2	7	137.00	1/0	19	109.00	28.00	20%
4/0	19	406.00	300 MCM	19	311.00	95.00	23%
500 MCM	37	948.00	750 MCM	61	729.00	219.00	23%

Officers and directors of AACC pose with Earl Bodem, Air Force Logistics Command, at September meeting.

NEW SOCIETY PUSHES CLEAN ROOM SPECS

ILLINOIS INSTITUTE of Technology was selected as the site of the first major seminar of the new American Association for Contamination Control (AACC). More than 50 people, with representatives from the Services, attended this meeting held essentially to discuss and refine the rather controversial Air Force Tech Order 25.

Officially, this is labeled as Technical Order 00-25-203 with the title of Standard Functional Criteria for Design and Operation of Clean Rooms. Copies may be obtained from the Office of Technical Services Branch, Department of Commerce, Washington 25, D. C.

In their various maintenance activities for Air Force equipment and components, the Air Force operates some 13,500,000 sq ft of industrial space, over 2,300,000 of which is controlled in some degree. Some 319,000 sq ft are in Class I-III—Clean Rooms. This area is expected to be doubled in the near future, according to Earl Bodem of USAF Logistics Command Headquarters, Wright-Patterson Air Force Base, who is the author of this order.

While these specifications were prepared essentially for maintenance activities in Air Force installations, manufacturers of all types who do business with the Services hope that the Navy, the Army and the Air Force can agree on a standard Department of Defense technical order, or specification, that can be and will be applied to procurement.

Those in attendance at this meeting and shown in the picture above are, standing left to right: M. Pratt, Plant Engineer, New Departure Div., General Motors Corp., Sandusky, Ohio; H. Hamilton, Advanced Manufacturing Engineer, General Electric Co., St. Petersburg, Florida; E. Sloane, Editor of *Air Engineering*, Detroit, Michigan; R. Avery, Director of Application Engineering, Cambridge Filter Corp., Syracuse, N. Y.; R. Cadle, Department Manager of Stanford Research Institute, Menlo Park, Calif.; J. Barhite, Staff Engineer, Eastman Kodak Co., Rochester, N. Y.; J. Mason Pilcher, Director of Environmental Mechanics Research, Battelle Memorial Institute, Columbus, Ohio; C. Schmid, Manager of Plant Engineering and Facilities, Kearfott Div., General Precision, Inc, Little Falls, N. J.; A. Lieberman, Research Chemical Engineer, Armour Research Foundation, Chicago, Illinois.

Seated, left to right are: I. Kodel, Mechanical Engineer, Sandia Corp., Albuquerque, N. M.; E. Bodem, Air Force Logistics Command, Wright-Patterson Air Force Base, Dayton, Ohio; and J. Mildon, Corporate Plant Engineer, Lear, Inc., Grand Rapids, Michigan.

Officers of this newly organized group are: James Mildon, president, Irving Kodel and Alvin Lieberman, vice presidents, and Eugene Sloane, executive secretary.

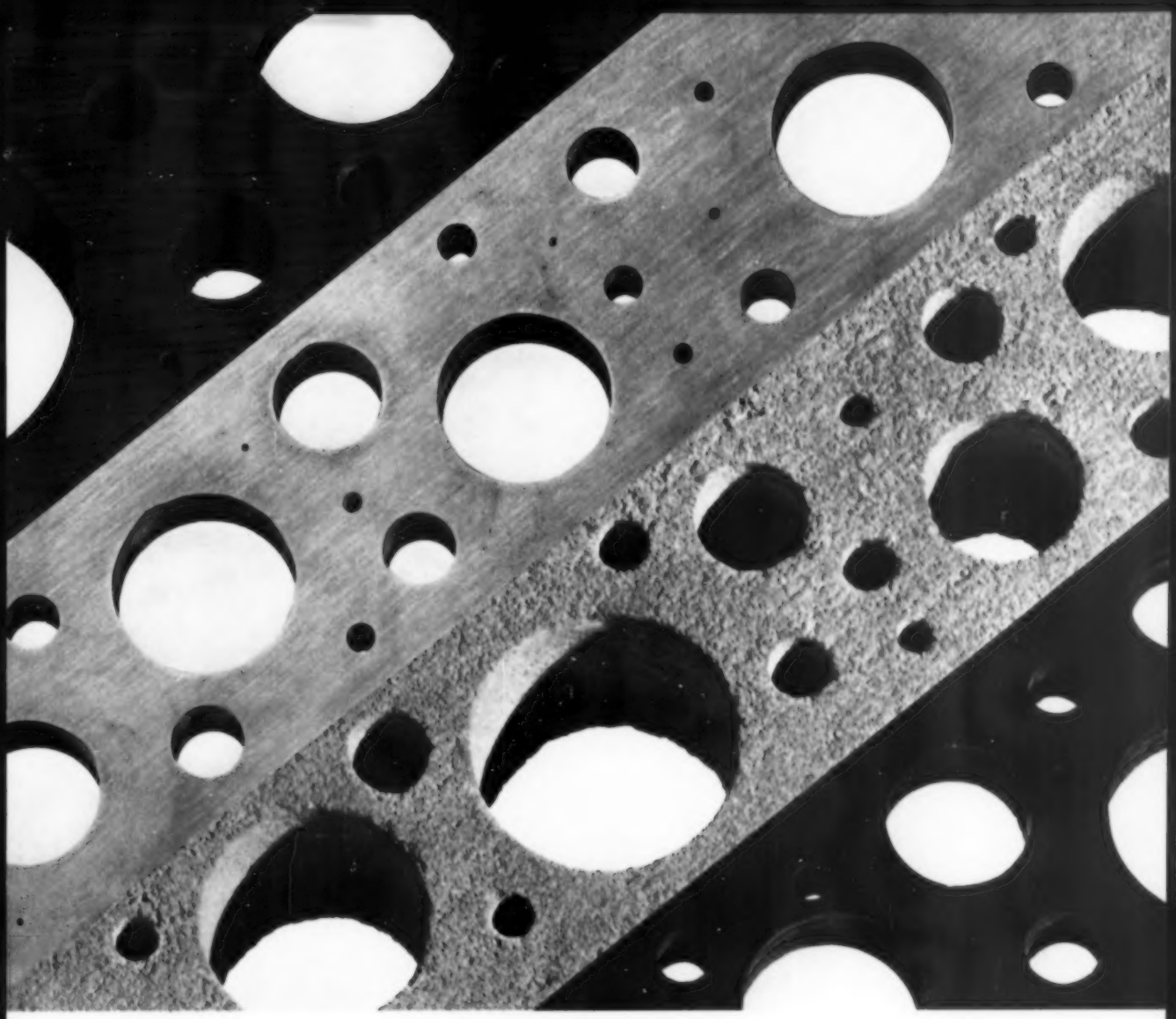
Much of the discussion revolved around the possibility or impossibility of accurate measurement of particle content in the sizes of from 10 down to 0.3 microns. Several types of instruments are in use for this purpose, but none seems to be effective for all materials over the complete range; nor does there seem to be any possibility of correlation of the measured results except for a specific material and within a relatively narrow particle size range—and probably for a rather narrow humidity range.

Another point of difficulty seems to be setting standards of humidity. For ferrous products this must be kept low, 40 per cent or less, which begins to get in the range of static difficulties with certain materials. Other materials require a much higher humidity to give the necessary pliability to the material involved.

In an endeavor to obtain some degree of correlation and also to test the effect of this with various instruments, the Air Force is having an exhaustive series of tests made for them by the U.S. Public Health Service Laboratories in Cincinnati.

The entire meeting was tape recorded. A transcript can be purchased by AACC members for $5.00, by non-members for $7.50, from the American Association for Contamination Control, P. O. Box 774, Detroit 31, Michigan. **End**

Circle 565 on postcard, page 33 ➔



There's a Black & Decker Drill for every hole on this page

And now for every Black & Decker Drill (all 58 of them), there's 20-25% longer life, extra drill power, handier handling. These built-in bonuses attest best to the tool engineering and design that never follows, always leads. ⇨ ⇨ ⇨

New Motor Varnish—insulates motor wire for running-temperatures up to 38% higher, increases overload capacity as much, and adds to motor life.

Advanced Commutator Lead Fusing gives better bonding at higher temperatures. New carbon brushes get 50% longer life, cut commutator wear.

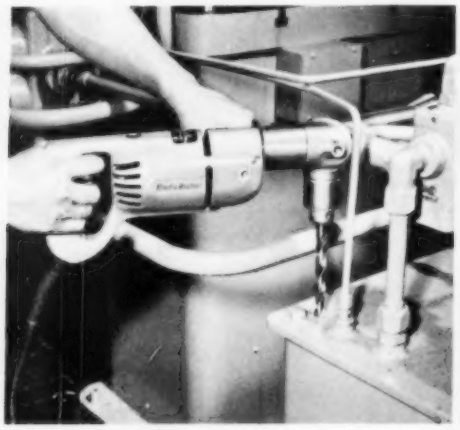
Improved Cooling System uses new-design fans, larger ventilating holes to make every Black & Decker Drill the coolest handling tool for the job.

More Power Per Pound in every B&D Drill helps you get through your work quicker and cleaner. Contour handles afford the easiest grip, too.

BLACK & DECKER'S LONGER LIFE LINE

58 B&D Drills get through the work faster, easier . . . have more drill power to last longer

NEW! ½" End Handle Drill is ideal for tough maintenance and production jobs. So powerful it has 48 ft./lbs. lock torque, highest of comparable tools.

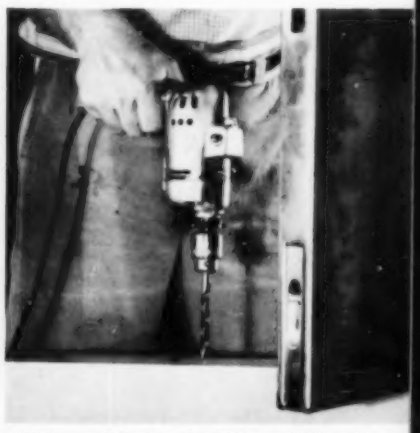


NEW! ½" Right Angle Drill has a head for getting around corners, in tight places. Reverse the end attachment to speed up or slow down.

REDESIGNED! ¼" End Handle Drill has a slimmer, more compact profile, ball-bearing construction. Features long-life, cooler-running motor.

Magnetic Drill Press in ¾" and 1¼" sizes, sticks to the job in any position. 2-speed 1¼" also available. All models reverse. Manual or remote control.

¾" Heavy-Duty Drill has more muscle than any drill its size, positive drive clutch, proved reverse power that can pull a full-sized Diesel locomotive.



⅜" Reversible Scru-Drill® is a drill and screwdriver in one. Drives or removes screws, nuts and bolts; drills ¾" capacity in steel, ¾" capacity in wood.

THE BLACK & DECKER MFG. CO., Dept. D-161
Towson 4, Md. (In Canada: Brockville, Ont.)

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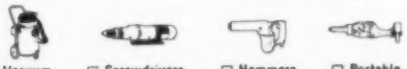

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Black & Decker®

CUTS MAN-HOURS TO MINUTES

Every bit counts . . . when you go through maintenance and production jobs with any one of Black & Decker's 58 drills. Power? B&D's newly beefed-up motors won't back down in the toughest going. Handling? When you grip a B&D Drill naturally, it's never off-balance, always easy to handle. Durability? Black & Decker Drills lead a rugged life — and love it! You'll find B&D tools are sold by leading distributors everywhere. *For sales or service, look in the Yellow Pages of your telephone book under . . .* TOOLS ELECTRIC

A PLANT MOVES —BUT PRODUCTION GOES ON

By **JOHN POSA**, President
Supreme Steel Equipment Corp.
Brooklyn, N.Y.

RELOCATING A PLANT in full operation is like moving your kitchen with food on the stove. If you don't plan far in advance, you may go without dinner.

As a result of expanded operations from 1955 to 1959 Supreme Steel Equipment Corp. was forced to expand from 35,000 sq ft of plant area to 50,000 sq ft. But even after securing this additional area, we were still one step behind our actual needs because we absorbed another company, developed Conserv-a-File, our shelf filing unit, plus a line of library shelving, and expanded our line of cabinets. Adding these products to our basic stock of storage equipment put a great strain on our space.

In 1959, our production headaches began to multiply: we originated and marketed our motorized shelf filing unit. While it is the star of our line, it was a nightmare in our 40,000 sq ft of working space.

Our normal plant operations—before we started producing the motorized filing unit—consisted of shearing, forming, welding, finishing, quality control checking, some assembly and finally packing. With the above-mentioned unit we became involved with one more step—testing. This meant preassembling units before shipment.

We were fortunate that 10,000 sq ft of space became available next door to us, and we grabbed it and turned it over to the finishing stage of manufacture. Even then, we knew that we would still be pinched for testing space, while the first stages of manufacture of this unit were being completed in the old space. There was no question about it: in a year we would have to find another plant.

To illustrate this problem, let's take the motorized filing unit itself. The standard model occupies 12 sq ft of floor space plus the space occupied by testing personnel. This is a small part of a 10,000 sq ft area until you run into the problem of delivering 225 units as we did late last year. The Chase Manhattan Bank ordered 225 specially designed units for its new headquarters. In order to process these machines we had to put on 20 per cent more personnel, and run into overtime. In a growing business you expect to put on more men, but if the plant is large enough you can avoid overtime.

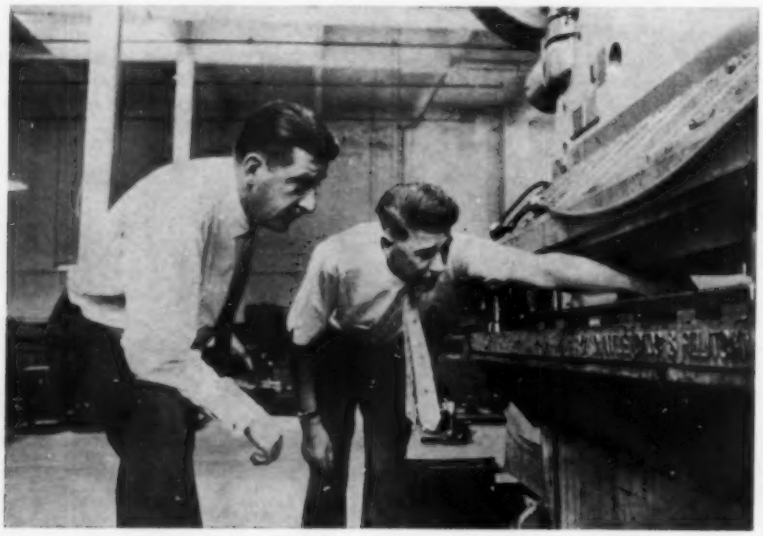
We needed twice our floor space plus additional room for draftsmen and administrative personnel. It took us a year to find what we wanted and, ironically, it was right under our noses—just four blocks from our present plant. It had 102,000 sq ft of plant space plus 15 per cent more office space.

We tackled the problem of moving late last summer, at least six months before the move would take place. It was simple to plan the move of the administrative department since no heavy equipment was involved—that could be done on a weekend. The heavy equipment was our main problem: our equipment ranges from 10 tons to our 150-ton power brakes.

It was soon apparent that the key to our production was in the finishing processes—cleansing, spraying, baking, etc. This equipment takes four to six weeks to set up, as compared with a maximum of two weeks for all the rest. On this basis we worked out the following schedule:

1. Order new finishing equipment (which we sorely need) for delivery March 1;
2. (March 1): start setting up the finishing equipment at the new plant six weeks before we move;
3. (March 6): stockpile processed steel at the old plant up to the finishing stage;
4. (March 6): stockpile raw steel at the new plant, while the equipment is made ready;
5. (March 13): move and install all our equipment (except the old finishing equipment)—a two week project;
6. (March 13): leave the finishing crew on the job at the old plant during the move;

Author Posa, right, discusses die changes on new press with Doward Wilkinson, Plant Superintendent. Press was installed while plant was operating.



(Continued on page 208)

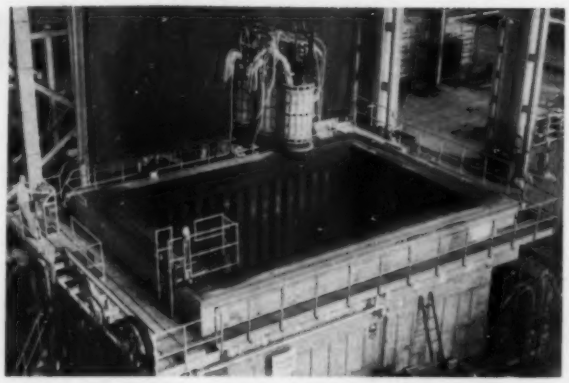
Outsize Vacuum Drying Chamber Used To Cure Electrical Insulation

ELECTRICAL INSULATION for Allis-Chalmers power transformers, produced at their Terre Haute plant, is conditioned in a drying chamber that combines the effects of vacuum and automatically-controlled heat.

Measuring 18 ft by 27 ft by 26½ ft high, the drying chamber was designed and supplied by F. J. Stokes Corp. It was designed for full vacuum application and is structurally reinforced with 21-in. WF beams on 14½-in. centers. As many as five transformers can be processed in the chamber at one time. The top cover is full-opening, being hinged along its 27-ft side.

Previously, a typical insulation load required from one to three weeks to dry. Now, the drying cycle is completed in less than 24 hours. The new drying equipment, operating at pressures as low as 4 mm Hg, and with built-in controls to automatically keep the heating limits within safe bounds, serves to dry out the transformers thoroughly. And, it does it in a shorter time and at a lower temperature than would be possible by drying at atmospheric pressure.

A unique sealing system at the main cover was provided by Stokes. When the cover is lowered into position, the cover gasket is inflated to 230 psig; it expands within guides to effect a seal against the top flange of the drying chamber.



Straightening Machine Handles All Types of Metal Shapes

ALL TYPES OF cold drawn shapes produced by Wisconsin Steel Division of International Harvester Company, South Chicago, Illinois, are handled on this Blaw-Knox straightening machine, including squares, flats and hexagons of varying sizes.

Design of the machine features a variable bending span on the rolls which allows Wisconsin Steel Works to spread the roll centers apart or move them closer together and thus get greater straightening accuracy on a wider range of products.

The unit can handle squares up to 3 in., flats up to 1 by 6 in. and hexagon bars up to 3 in. It is a high production unit, running at throughput speeds up to 300 fpm travel of the workpiece. Quick changeover of the rolls is possible by the modified overhung roll design.

Plastic Waffle-Forming Pans Cut Construction Time, Costs

COST, SPEED, and quality—important factors on a construction job—have all been improved by the use of molded fiber glass concrete forming pans on a 5-building project at Penn State University. Virginia Engineering Co., prime contractors, credit the pans with a 15 per cent saving in initial cost, a reduction in total stripping time to 5 seconds a sq ft, and a true, smooth finish that obviates pre-painting finishing.

The pans, molded of fiber glass reinforced polyester by the Molded Fiber Glass Co., have an outside dimension of 24 in. by 24 in., a void of 19 in. by 19 in., a wall thickness of 0.110 in. and weigh 6¾ lb.

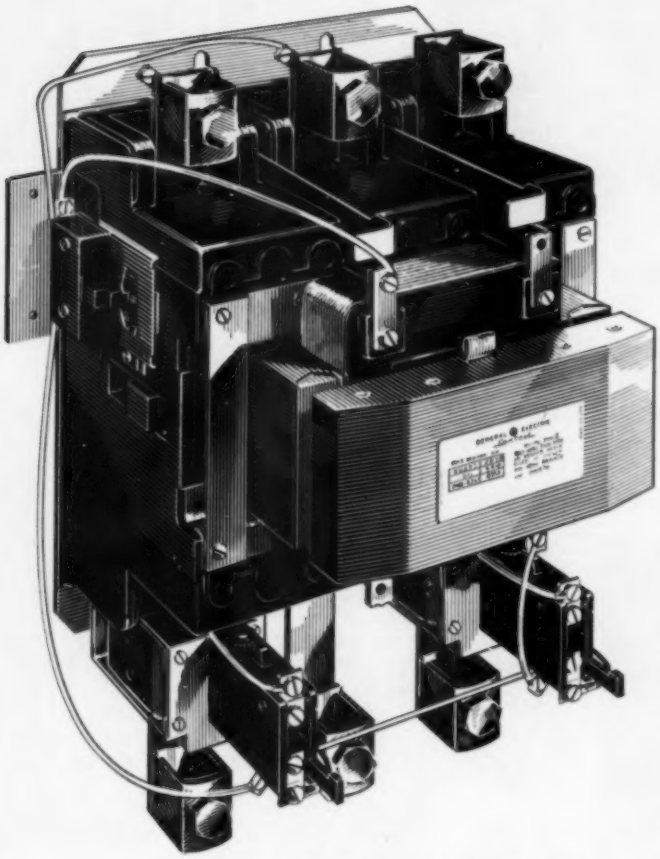
Six thousand pans were purchased for this project, at a cost of $35,520. Using a quoted price of $1.00 per pan per pour for steel domes, the use of the pans to make 42,000 pan-pours resulted in a saving of $6480.00. Shipping costs were less, too, since the plastic pans weigh 9 lb less than their steel counterparts.

The contractor also credits the pans for time and labor savings required to handle, erect and strip the form work. According to the resident superintendent, costs are running under 6 cents a sq ft for setting, stripping, cleaning and moving the pans to the next floor; and an estimated 19 cents a sq ft for all other form costs.

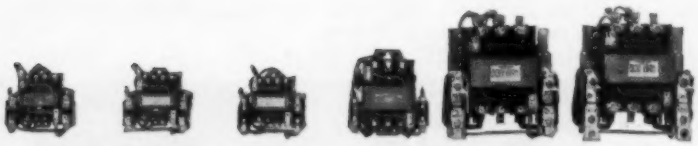
The molded fiber glass pans come ready to use and are quickly set in place by a broad-headed nail at each corner. A single nail can be used to anchor a corner of four forms.

THE NEWEST STARTER FROM GENERAL ELECTRIC

. . . and what it means to you



NEW NEMA SIZE 5 STARTERS now added to G-E 100-Line feature extremely small size, plus all 100-Line benefits: Height—14¼"; Width—11¾" Area—167.4 sq in.



NEMA SIZE 00	NEMA SIZE 0	NEMA SIZE 1	NEMA SIZE 2	NEMA SIZE 3	NEMA SIZE 4
H-4 1/2"	H-4 1/2"	H-4 1/2"	H-6 5/8"	H-9 1/2"	H-10"
W-5 3/32"	W-5 3/32"	W-5 3/32"	W-6 1/4"	W-8 5/8"	W-8 5/8"
A-22.9 sq in.	A-22.9 sq in.	A-22.9 sq in.	A-41.6 sq in.	A-76.5 sq in.	A-86.2 sq in.

6 DISTINCT ADVANTAGES YOU CAN'T GET ELSEWHERE

General Electric announces the development of new NEMA Size 5 magnetic starters and contactors—up to 65 percent smaller in open forms than previous designs.

This addition to the G-E 100-Line Starter "family" means you can now get seven sizes that give you six distinct, measurable advantages you cannot get from any other single brand of motor control. They are:

1. **SMALLER SIZE**—particularly in the more popular forms (Sizes 0 and 1). On larger forms, reduced height (as much as 41 percent on Size 5 units alone) saves critical panel space. See dimensions at left below.
2. **EASE OF WIRING**—all terminals are "out front," visible and accessible. Wiring for all sizes is straight through (this can save up to $8 in wire alone for Size 5 installations where line leads come in top and out bottom).
3. **SIMPLIFIED MAINTENANCE AND INSPECTION**—contacts can be inspected or coils changed in less than a minute on all sizes. No tools required on Sizes 00 through 4; only a screwdriver on Size 5.
4. **MORE MODIFICATION KITS**—industry's most complete line lets you modify existing starters on-the-spot in minutes to meet special operating conditions. Result: reduced change-over expense. All starter enclosures have cover knockouts for field-addition of push buttons, selector switches, and indicating lights. Other kits include auxiliary contacts, third overload relay, fuse clips, and coils.
5. **FIELD-*PROVED* DESIGN**—well over 1,000,000 units are operating in the field today. Exhaustive testing in laboratories and on customer applications since the 1957 introduction is your assurance of 100-Line dependability.
6. **"FAMILY" DESIGN BENEFITS**—G.E.'s 100-Line offers all forms and sizes in the same basic design. You benefit from common installation procedures; common maintenance and inspection techniques; reduced inventory; and such operating conveniences as adjustable overload relays for all sizes. Mounting dimensions for Sizes 00, 0, and 1 are identical; so are dimensions for Sizes 3 and 4. Common mounting dimensions and wiring procedures save time and space during panel layout; also when changes occur in horsepower requirements or industry specifications.

Meet all your control requirements—up through 200 hp—with the uniform, field-proved 100-Line, available in all popular forms: Sizes 00, 0, 1, 2, 3, 4, and 5 contactors and starters; plus combination starters; reversing and two-speed controllers. Contact your G-E sales engineer or distributor, or write Section 811-19, General Electric Company, Schenectady 5, N. Y.

Progress Is Our Most Important Product

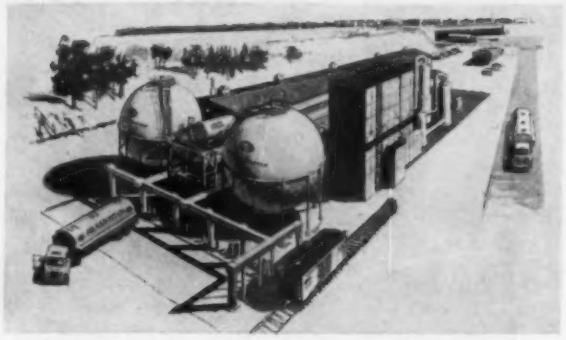
GENERAL ELECTRIC

Circle 566 on postcard, page 33

Twenty-two-mile-long Pipeline Takes Nitrogen to Chemical Plants

LONGEST in the United States, a nitrogen pipeline will soon provide high-purity nitrogen in large quantities to plants in the rapidly expanding Delaware Valley chemical complex. Air Reduction Company, Inc. will pipe more than 100 tons of nitrogen per day to du Pont and Shell Chemical Company plants at the ends of the T-shaped line.

The pipeline, which will be more than 22 miles long, will originate at Airco's 6½-million-dollar air separation plant now under construction on a 9-acre site at Claymont, Delaware, and cross the Delaware River into New Jersey. One leg will go 12 miles north to Shell Chemical's polypropylene plant at Woodbury and the other 10 miles south to du Pont's Chambers Works at Deepwater Point. In the future, taps are planned at other points along its length to serve additional customers.



Another pipeline, this one of stainless steel, will deliver Airco oxygen to customers in New Jersey. The oxygen and nitrogen pipelines are two of eight being constructed by the SunOlin Chemical Co. to deliver raw materials from Delaware and Pennsylvania to chemical plants on the New Jersey side of the river.

From its Claymont plant, Airco will pipe more than 100 tons per day of oxygen into SunOlin's ethylene oxide plant, and will also supply SunOlin with over 150 tons per day of high-purity nitrogen. Thus, the pipeline's primary customers will consume over 250 tons per day of nitrogen and 100 tons per day of oxygen. Additional tonnages of both products will be available to supply other customers in the area. Total capacity of the plant, which is designed for easy expansion, ultimately will be 750 tons per day of oxygen and nitrogen, plus 12 tons per day of argon.

"Lazy Susan" Turntable "Serves" Mix for Coating Electrodes

ANYWHERE from 7 to 17 separate materials are combined at the recently modernized Leola, Pa., plant of A. O. Smith Corporation, for coating electrodes.

Constituent materials for the individual coatings are selected from an industrial "lazy susan" turntable, then weighed out on an electric scale. The printomatic scale also makes a permanent record of all materials in each batch.

The ingredients are then dry-mixed and wet-mixed. Coating batches are then air-evacuated, for optimum adhesion to the core wire, and compressed into cylindrical slugs which are fed to an extrusion press.

At this stage, core wire and coating meet to become electrodes. Coating is automatically extruded on the wire to form about 1200 electrodes a minute.

Machine Rolls Metal "Donuts" Into Precision Rings

A NEWLY-INSTALLED ring rolling machine, built in West Germany, rolls alloy, stainless and carbon steels at the Kropp Forge Co., Chicago. The innovation improves Kropp's ability to supply steel rings up to 80 in. in diameter for missiles, rockets, jet engines, heavy equipment and gear blanks.

The entire machine, about 2/3 of which is recessed in a floor pit, weighs 50 tons. It operates on 200 hp. The mill operator handles little more than "on" and "off" levers, since the dimensional requirements are preset and the mill automatically disengages when the ring is rolled to size.

The machine is composed of a powered king roll which exerts the turning force to roll the ring, two guide rolls that follow the ring as it is rolled—to keep it round and to eliminate vibration—and a rolling mandrel mounted on a hydraulic forward-moving carriage.

To roll a ring, a prepared "donut" is placed over the rolling mandrel. The carriage then moves forward hydraulically until the king roll contacts the outside of the donut.

As pressure (max. 90 tons) is applied, the circumferences of the ring grow in length, forming a ring of larger diameter. When the ring reaches a predetermined diameter, it actuates a limit switch that releases rolling pressure.

With this machine, rings can be rolled with an outside diameter as small as 15 in. or as large as 80 in., with a maximum weight of 2000 lb.

Compact Packaged Air Preheater being unloaded for installation on new 100,000 lb/hr boiler at Hoffmann-La Roche's Nutley, N. J. headquarters. In operation, it will increase the temperature of the combustion air 375°F—thereby increasing boiler efficiency by approximately 8%.

PACKAGED AIR PREHEATER

WILL RECOVER 330°F FROM NEW BOILER FOR HOFFMANN-LA ROCHE INCORPORATED

Hoffmann-La Roche, one of the leading producers of pharmaceuticals, vitamins and aromatic chemicals, specified a Ljungstrom Packaged Air Preheater for their new boiler for three reasons: 1) This compact, preassembled unit is ready to run as soon as it's connected to the power line and ducts—no extra installation or erection costs; 2) The unit occupies only about 450 cubic feet of space but will cut boiler exhaust temperatures from 680°F to 330°F—for about 8% saving in fuel; 3) Savings in fuel alone—roughly 1% for every 40°F drop in exit gas temperature—can pay for the unit in two short years!

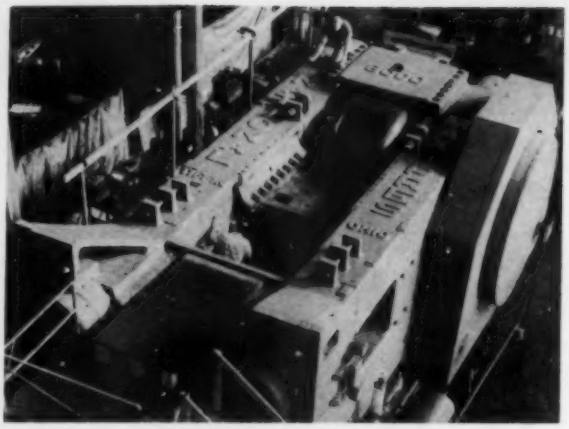
Packaged Ljungstroms are available in sizes for use on boilers in the 25,000 to 250,000 lb/hr range—can give you these same fuel saving advantages. For full information, write today for our 14-page Packaged Air Preheater booklet.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

Circle 567 on postcard, page 33

New Forging Press So Big, It's Being Built On Its Back



So BIG THAT IT is being assembled on its back, a 1,400,000-lb forging press will double the forging capabilities of the Jet Division of Thompson-Ramo-Wooldridge, in Cleveland.

Because of its size—twice that of any unit in T-R-W's plant—the press, with its 8000-ton capacity, will produce present forgings with fewer blows, and has the capacity to handle even larger parts, that were previously impossible to forge.

Four forged steel tie-rods, 2 ft in diameter, extend the full length of the 31-ft-high press. Threaded, they are secured by 2-ton "nuts," to absorb the full forging load of each blow.

The eccentric shaft alone weighs 63,000 lb, and is more than 4 ft in diameter at the throw. The press will run at 34 strokes per minute, powered by a 500 hp motor.

Control center for the machine and its instrumentation is 23 ft long, 10 ft high and 2½ ft deep. This includes the main drive panel, and auxiliary panel for lubrication and motor cooling. Electronic indicators measure the tonnage exerted by each blow of the ram.

With the dies designed by Thompson-Ramo-Wooldridge engineers, and the special steel die block employed in its bed, the press will produce precision forgings to tolerances of 0.004 in.

Blackboard Drawings Reduce Engineering, Design and Drafting Costs

A NEW engineering method which is said to cut drafting costs from 33 to 50 per cent is called Panoramic Design Technique. It was developed by T A B Engineers, Inc., a Chicago consulting engineering firm.

The method does away with drawings made by using the conventional drawing materials. Instead, engineers now put their designs directly on wall-size blackboards and record them photographically.

By sketching the basic design on the blackboard, full-size or larger, the engineer can visualize the design more easily. He can also see how its component parts fit together. This, in turn, speeds the process of creative design.

Ammonia "Cracker" Supplies Purging Atmosphere for Furnace

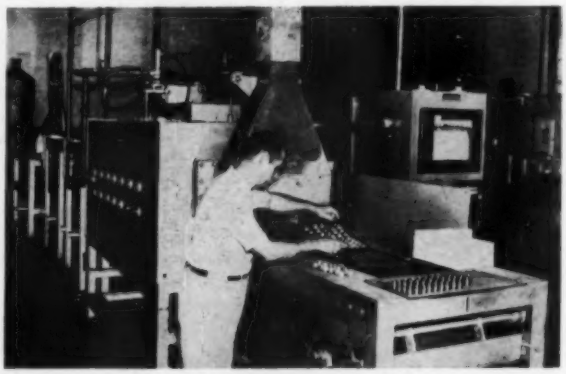
IN THE MANUFACTURE of electronic components, Amphenol Borg Electronics Corp. uses a mesh belt conveyor furnace for copper brazing of low-carbon steel parts. A rich exothermic atmosphere is required in the furnace to produce a reducing condition compatible with the brazing operation.

When a furnace is operated continuously, the exothermic atmosphere normally will contain enough hydrogen and carbon monoxide to produce bright, clean copper brazing. However, when the furnace is idled at night at a temperature of approximately 1500 F, the exothermic atmospheric supply is shut off.

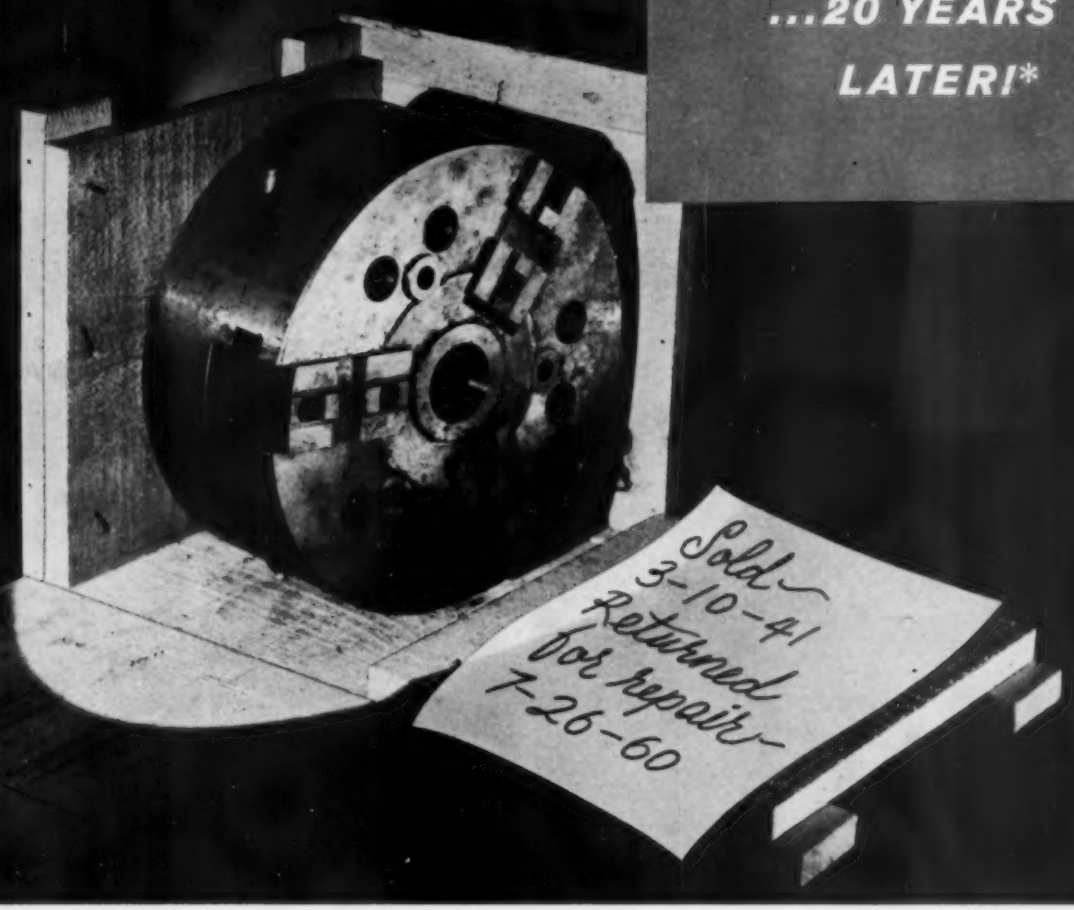
Each morning, before processing could begin, the furnace had to be purged of contaminates that accumulated overnight, and reducing conditions restored. It normally took about three hours a day to restore operating conditions.

Engineers of the Hevi-Duty Electric Co. recommended the addition of an Atmo-Gen atmospheric generator to the system, to be used for fast purge purposes. This type of generator is essentially an ammonia-cracking unit which produces an atmosphere containing 75 per cent hydrogen. The complete unit includes an electric tube furnace with automatic temperature control, a catalyst-filled alloy retort, piping, and flow regulation accessories.

In operation, the equipment causes a breakdown of ammonia gas into nitrogen and hydrogen. The ammonia gas is fed through a flowmeter into a heated catalyst-filled retort, where the breakdown takes place. The nitrogen and hydrogen atmosphere is then fed into the exothermic atmosphere in the furnace, reducing purge time from three hours to only 10 minutes.



the chuck that came back ...20 YEARS LATER!*



This chuck was returned for refurbishing after 20 years of service!

Actually, this is not an out-of-the-ordinary service record for Logan chucks, because they are built throughout with extra factors of strength and durability to resist deflection, misalignment and wear—and to deliver accurate, dependable and efficient service year after year on any type of operation.

If you would like more information about these rugged, long-lasting air and hydraulic chucks, or any of Logan's other products, just fill out the coupon below.

**Customer's name furnished upon request.*

LOGAN
AIR AND HYDRAULIC OPERATED MACHINES

Check the items you want, fill in your name and address, tear out and mail to:

Logansport Machine Co., Inc. • 760 Center Avenue, Logansport, Indiana

___100-1 AIR CYLINDERS
___100-2 MILL-TYPE AIR CYLS.
___100-3 AIR-DRAULIC CYLS.
___100-4 AIR VALVES
___100-5 LOGANSQUARE CYLS.
___100-6 ULTRAMATION CYLS.
___100-7 SUB-PLATE AIR VALVE
___300-1 CHUCKS
___300-2 PRESSES
___200-1 HYD. POWER UNITS
___200-2 ROTOCAST HYD. CYLS.
___200-3 750 SERIES HYD. CYLS.
___200-4 and 200-7 HYD. VALVES
___200-6 SUPER-MATIC CYLS.
___ABC BOOKLET
___CIRCUIT RIDER
___CALCULATOR
___FACTS OF LIFE

Please send copy of catalog

NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

Circle 568 on postcard, page 33

At Diebold, Inc., a total of 300 Perfection Schwank Gas Infra-Red Heaters maintain a constant 70° in 1

Diebold Cuts Heating Costs 35%...with

"We know it sounds impossible, but our Perfection Schwank *Gas* Infra-Red Heating System has reduced heating costs 35%," says William Roby, Assistant Plant Engineer at Diebold, Inc., Canton, Ohio. "Heating comfort alone would have justified our investment, but here's the clincher. In another 2½ years, our tangible savings in heating costs will have completely paid for the entire *gas* infra-red system! Gas keeps the *fuel* cost low. And there are practically no maintenance costs."

"It's as simple as this . . . in the Fall we turn the *gas*-fired system on . . . and in the Spring we turn it off. In nearly two full heating seasons, our total heating maintenance was a single dusting of the *gas* infra-red heaters. The *gas*-fired Perfection Schwank System keeps materials, floors, and machinery at a constant, uniform 70° — *an ideal temperature for employees.* What's more, the system is completely noiseless and draftless; prevents corrosion and maintains humidity at an optimum level for efficient production."

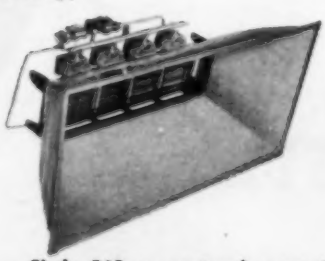
uninsulated buildings with total floor space of 180,500 sq. ft. and a total volume of 6,500,000 cu. ft.

Perfection Schwank **Gas** Infra-Red Heaters

As over 30,000 users have discovered, Perfection Schwank *Gas* Infra-Red Heaters give all the advantages of modern *gas* heat... high efficiency, precise control, speed, safety, cleanliness, dependability and unbeatable fuel economy.

Heat better for less with Perfection Schwank *Gas* Infra-Red Heaters. For complete information, contact your local Gas Company or write to Perfection Division of Hupp Corporation, licensee of American Infra-Red Radiant Co., 1135 Ivanhoe Rd., Cleveland 10, Ohio.

American Gas Association.



Approved by A.G.A., Underwriters, C.G.A. and C.S.A. Under Schwank U.S. Patents 2,775,284 and 2,870,330 and pending applications.

FOR INDUSTRIAL HEATING ...GAS IS GOOD BUSINESS!

Circle 569 on postcard, page 33

new electronic order processing drastically reduces your electrical apparatus renewal parts inventory

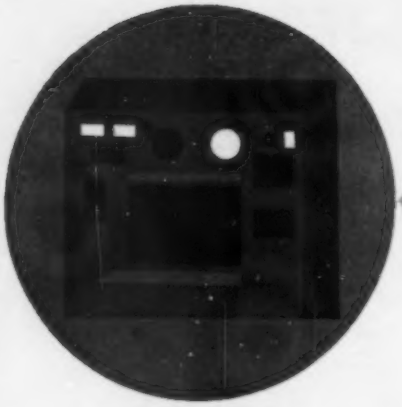
1

Customer phones or mails his order for renewal parts to his local Westinghouse sales office.

3

A computer in the Pittsburgh order processing center determines that the order can be filled from the Westinghouse warehouse which regularly serves the customer and transmits the required information to that warehouse. The teletype receiver in that warehouse goes into action and produces all shipping forms.*

*If the nearest warehouse inventory records show insufficient stock, the computer would review—immediately and automatically—the inventory of other nearby warehouses which could ship. Then shipping information would be teletyped to the closest warehouse with stock and shipment would be made from there—all within the same 30 minutes.



J-99221

The new Westinghouse automatic order processing system puts every renewal parts order on the shipping platform . . . on its way to you . . . in 30 minutes.

This fantastically fast, accurate service is made possible by linking the Westinghouse teletype network . . . the world's largest industrial network . . . with an Electronic Data Processing installation in Pittsburgh. This automatic system compresses days into minutes. This new service, coupled with constantly improving rail, truck and air freight schedules, enables you to attain production and inventory efficiencies in your maintenance parts stocks that . . . up to now . . . you could only wish for.

With this new concept in distribution, you can reduce capital investment in renewal parts and help eliminate production downtime.

Take advantage of this exclusive, 30-minute order handling system for all your renewal parts requirements. Call your local Westinghouse sales engineer to place your next order . . . prove to yourself how quickly you can replenish your stocks with Westinghouse quality renewal parts. *You can be sure . . . if it's Westinghouse*

2

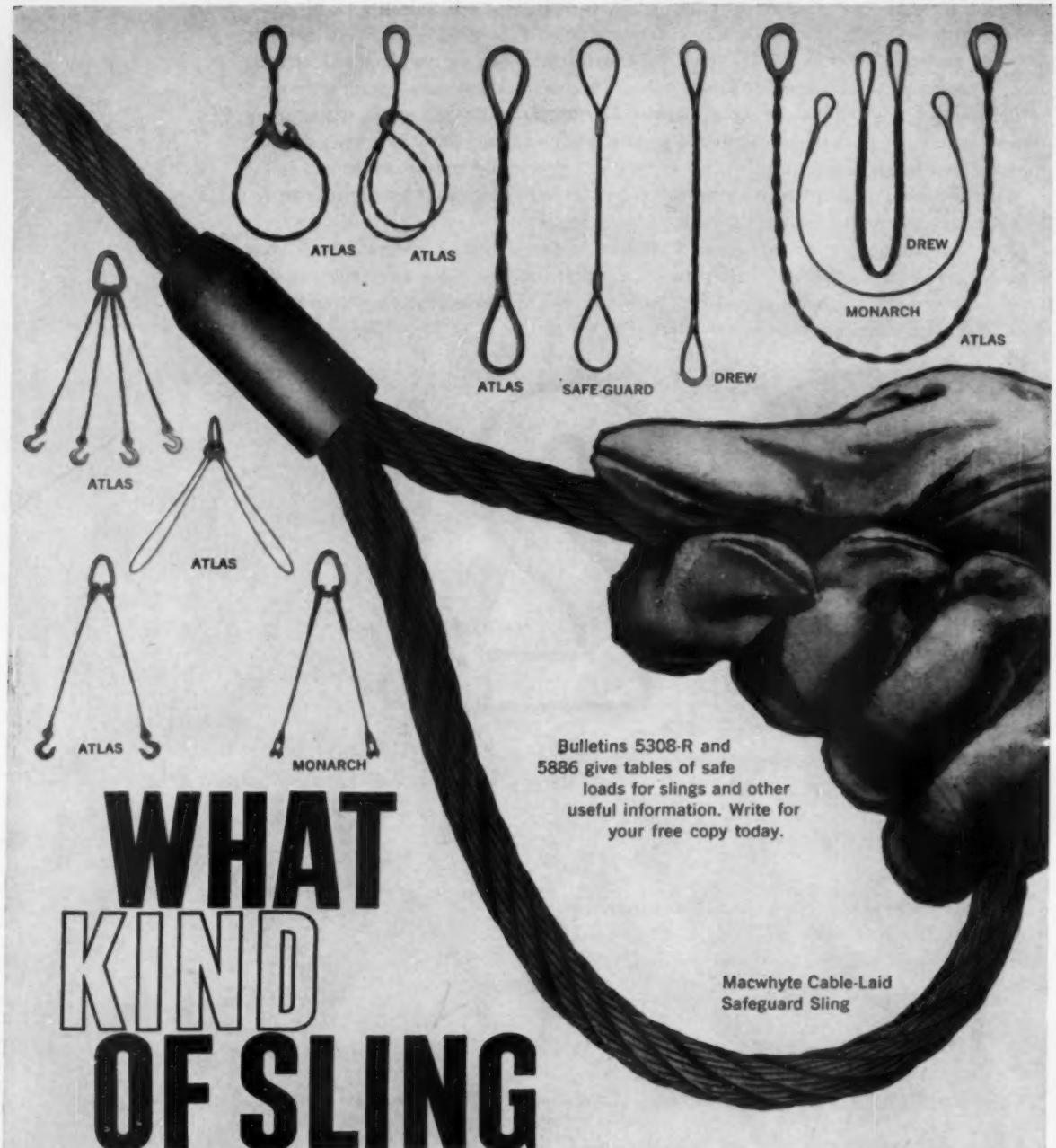
A teletype operator in the local Westinghouse office puts the order into code form on a paper tape which transmits it to the order processing center in Pittsburgh.

4

A warehouseman matches the teletyped forms to the proper part in stock and puts the order on the dock for delivery to the customer. An order placed anywhere in the country will be on the shipping dock within 30 minutes after it goes on the tape in Step 2. All paper work will have been done including automatic preparation of invoices for mailing to customer. All inventory records are automatically adjusted, even to ordering more of the item for the warehouse if stocks are low.

Westinghouse

Circle 570 on postcard, page 33



Bulletins 5308-R and 5886 give tables of safe loads for slings and other useful information. Write for your free copy today.

Macwhyte Cable-Laid Safeguard Sling

WHAT KIND OF SLING

GIVES YOU SAFEST, EASIEST SERVICE?

Whatever it is, Macwhyte makes it. The right Macwhyte is among hundreds of sizes and types designed for lightness, flexibility, and easy handling. Standard body styles include Atlas round-braided, Drew flat-braided, and Safe-Guard cable-laid. Special slings will be designed for your unusual load-handling conditions.

You can rely on Macwhyte distributors to give you the best wire rope and slings.

DRILLING ★ INDUSTRIAL ★ AIRCRAFT ★ MINING ★ LOGGING ★ ELEVATOR ★ MARINE ★ CONSTRUCTION

MACWHYTE WIRE ROPE COMPANY

2900 FOURTEENTH AVENUE, KENOSHA, WISCONSIN

Wire Rope Manufacturing Specialists Since 1896

Circle 580 on postcard, page 33

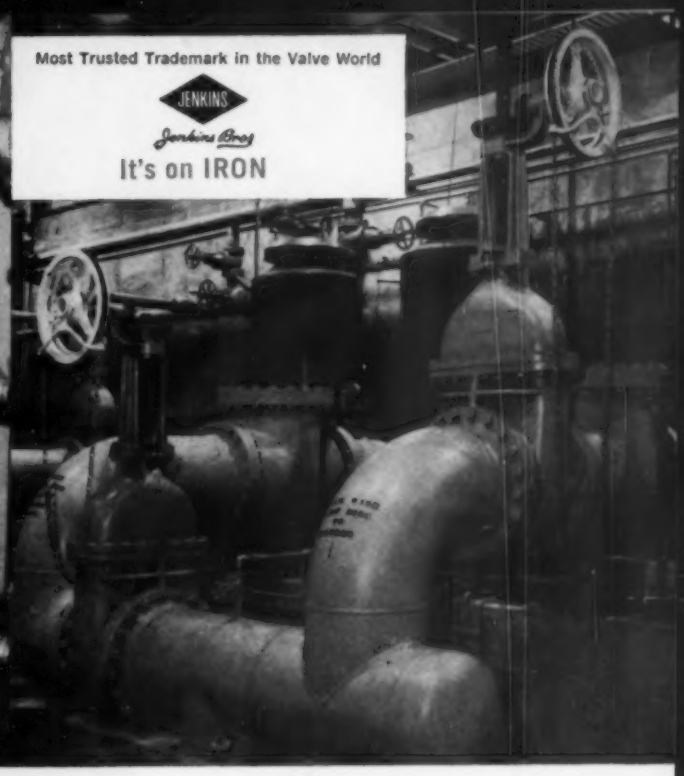
Circle 571 on postcard, page 33 ➔

Most Trusted Trademark in the Valve World

JENKINS

Jenkins Bros

It's on BRONZE



Most Trusted Trademark in the Valve World

JENKINS

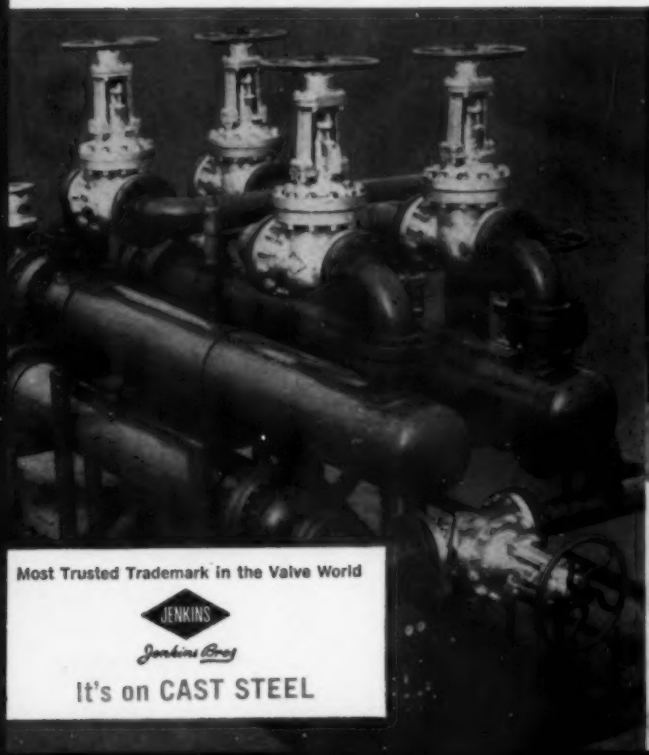
Jenkins Bros

It's on IRON

WHATEVER THE TYPE

the "DIAMOND" Says It's Tops

JENKINS DISTRIBUTORS have the most valuable exclusive feature in the valve world to simplify selling and assure customer satisfaction. The famous Jenkins "Diamond" mark answers all questions about design, construction, performance. Any valve buyer, seeing this mark, immediately grants **"this valve is tops".**



Most Trusted Trademark in the Valve World

JENKINS

Jenkins Bros

It's on CAST STEEL

Most Trusted Trademark in the Valve World

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It's on STAINLESS STEEL

JENKINS

MOST TRUSTED TRADEMARK IN THE VALVE WORLD

VALVES

JENKINS SINCE 1864 Jenkins Bros

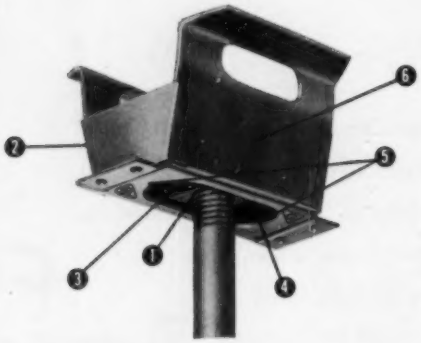
Sold Through Leading Distributors Everywhere

SELL MANAGEMENT, THEY SAY...

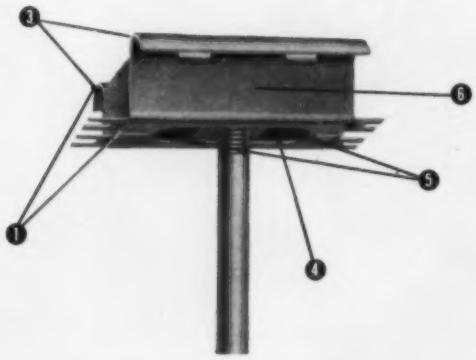
But somehow management gets pretty far
removed from things like electronic controls,
filtration systems, leaking roofs, and such.
So it's also a good idea
to sell the man the boss hired
to tell him what he should do. The man
who reads the answers each month in . . .

(The editors of PLANT ENGINEERING think you'll be interested in seeing how our sales department is publicizing your importance to industry. The advertisement above has appeared in magazines read by advertising and sales executives across the country.)

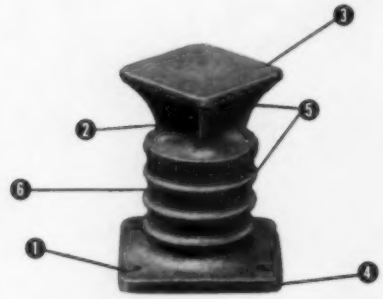
See all the extra features you get in Grinnell Concrete Inserts...at no extra cost!



GRINNELL WEDGE TYPE CONCRETE INSER" (Steel) FIG. 281 — 1. Nut and rod may be preassembled for fast installation. 2. Wedge-shaped body, held in compression by concrete, supports greater loads. 3. Elongated nut wedges against sloping sides of insert giving greater load-carrying capacity than would lower edge of insert. 4. Knockout (already removed) seals out concrete. 5. Full 1¾ inch lateral adjustment. 6. Supports up to 1200 lbs.



GRINNELL LIGHT WEIGHT CONCRETE INSERT (Steel), FIG. 285 — 1. Designed for shallow concrete, as little as 2 inches thick. 2. Extremely economical. 3. Arched flanges take reinforcing rods. 4. Knockout (already removed) seals out concrete. 5. Full 2 inch lateral adjustment. 6. Supports up to 400 lbs.



NEW GRINNELL SCREW CONCRETE INSERT (Malleable Iron), FIG. 152 — 1. Insert is firmly mounted on concrete form by nailing through four slots. No mutilation of forms from drilling special holes to hold insert. 2. Functional design . . . can be used in conjunction with reinforcing rods (rods fit under crown of cap). 3. Low over-all height helps keep insert stable when pouring. 4. Fits flush with ceiling for best over-all appearance. 5. Ribbed design, malleable iron for extra strength. 6. Supports up to 2120 lbs.

GRINNELL CB "Closed Back" CONCRETE INSERT (Malleable Iron), FIG. 282 — 1. One body size accommodates 5 sizes of rods and nuts. 2. Slot takes reinforcing rods to assure maximum load rating. 3. One-piece, closed back body prevents concrete seepage. 4. Teeth on insert and nut hold rod firmly in place. 5. Low height, broad flat bottom minimizes displacement. 6. Cast in corrosion-resistant malleable iron. 7. Supports up to 1430 lbs. (Also available in smaller "CB-JUNIOR" size that supports up to 770 lbs.).

You get *more* for your money from Grinnell, because Grinnell's huge volume reduces production costs . . . lowers prices right into line with competitive inserts offering much less.

Look at all you get with Grinnell Inserts: wider choices of types and sizes . . . better quality control . . . published ratings for *all* inserts! Underwriters' Laboratories and Factory Mutual approved. Faster delivery from nationwide warehouses, too. Moreover, you receive dependable field service by trained Grinnell personnel . . . no matter how far from the job site the sale was made! Grinnell Company, Inc., Providence 1, Rhode Island. Branch warehouses in principal cities.

Remember, The Best Costs No More — from America's #1 Supplier of Pipe Hangers and Supports

Call your local Grinnell Distributor for pipe hangers, cast and malleable iron fittings, steel nipples, welding fittings, Grinnell-Saunders Valves, unit heaters – all made by

Circle 573 on postcard, page 33

GRINNELL

NEW *Nalprep**: KEY TO EFFECTIVE PRETREATMENT OF COOLING WATER SYSTEMS

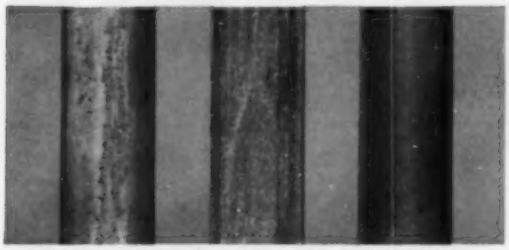
Triple-Action Treatment for Complete Preparation At Critical Points in Cooling System Life

Your experience can tell you at once that a newly-fabricated cooling system is never completely clean and free of oils, dirt, corrosion, and other contaminants . . . And that specifications calling for equipment "free of corrosion or corrosion products and thoroughly cleaned" are closer to wishful thinking than practical engineering. You know that a clean, fully-protected system will have fewer maintenance problems under the typically fluctuating conditions in a new system . . . but also that cleaning after the equipment has been in service destroys the protective film and exposes metal surfaces to rapid corrosion.

Now, with *Nalprep—and only with Nalprep*—cooling systems can be continuously, effectively, and economically protected from corrosion from the very start.

Nalprep performs three vital jobs at two critical times in the life of a cooling system. The times are: when the system is new; and immediately after cleaning. The jobs are: (1) removing organic and inorganic materials and deposits from metal surfaces, (2) preventing the clean, activated metal from reacting with anything but filming inhibitor, and (3) *at the same time* providing the initial protective film of corrosion inhibitor over the entire metal surface.

The Inside Story



No pretreatment | Degreasing only | With *Nalprep* treatment

Three identical mild steel exchanger tubes shown above received the same filming corrosion inhibitor dosages for one week. Tube at left shows rapid corrosion development when no pretreatment was given. Center tube was degreased only; shows beginnings of pitting and tuberculation. Tube at right received *Nalprep* treatment. Protective film is complete; corrosion non-existent.

Time lapses, varying from a few hours to days or even weeks, usually occur between the basic steps of construction, cleaning, testing and starting up cooling systems. These intervals expose metal surfaces to corrosion, so that when initial high-level filming inhibitor treatment is used at startup, without pretreatment, there are already corrosion sites in the system: areas which will not permit film formation to occur, regardless of the effectiveness or concentration of the inhibitor. This is why many properly-treated systems show disappointing, damaging corrosion-in-progress early in life.

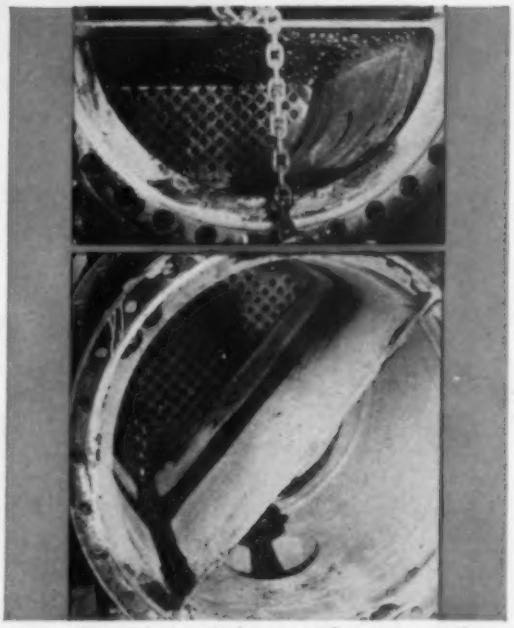
How *Nalprep* Works

Nalprep was developed to clean metal thoroughly, then protect it with corrosion inhibitor before it can react with anything else to begin forming corrosion sites. After initial *Nalprep* filming, and subsequent adequate maintenance dosages of inhibitor, corrosion need never be a problem again.

Fed to a new system in water—which ideally can be the water used for hydrotesting—*Nalprep* does a quick, complete job of cleaning and putting the initial film on all metal surfaces. Or *Nalprep* may be used to treat individual parts of a system, or to protect new equipment being added to an old system. After acid cleaning or mechanical cleaning, *Nalprep* can also be used for fast re-establishment of a tightly-adherent protective film.

It should be emphasized that high-level treatment alone is not a satisfactory substitute for *Nalprep* pretreatment.

Nalprep on the Job



Two new heat exchangers in the same cooling system are shown here after hydrotesting. New exchanger at top was not pretreated. Corrosion gained considerable headway during hydrotesting, as evidenced by the severe tuberculation visible on the baffle plate. Exchanger at bottom received *Nalprep* pretreatment. Note completely filmed baffle, tubes and sheet; absence of any corrosion residue.

Nalprep effectiveness, as illustrated above, leaves no doubt about the basic economy of including the *Nalprep* step in both new and cleaned cooling systems. Pretreatment, while adding little to overall time and cost, adds a great deal to subsequent savings in corrosion prevention, downtime and maintenance charges. Ask your Nalco Representative for details on *Nalprep*.

Nalco Technical Data Kit C4 tells the story of *Nalprep* development and results. Your copy free on request to Nalco.

**NALPREP is a Nalco Chemical Company trademark.*

NALCO CHEMICAL COMPANY

6217 West 66th Place • **Chicago 38, Illinois**

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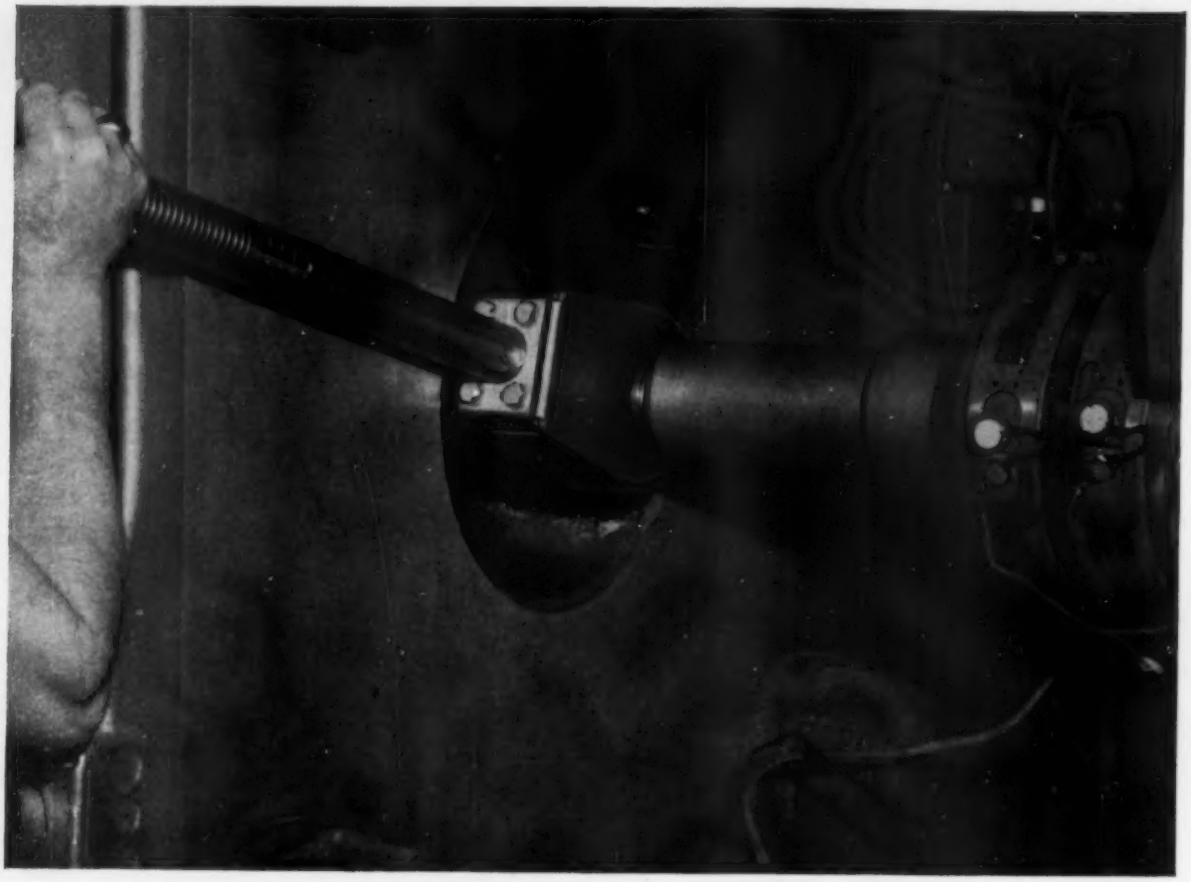
Nalco ®... Serving Industry through Practical Applied Science

Nalco CHEMICALS
Nalco SERVICES

Circle 574 on postcard, page 33

the SWENCH® is a wrench like no other — and will work where no other can. It's the world's first manual impact wrench. Loosens frozen nuts and bolts in seconds . . . tightens with precise accuracy every time. SWENCH is completely portable . . . needs no outside power — yet multiplies torque many times. It safely handles more bolt sizes than any comparable power wrench, but costs less. Read how you'll save with the SWENCH:



SWENCH® cuts 36-hour down-time to 30 minutes...saves $4,000

In plastic plants, the job is a common one: removing the hex nuts that hold the injection nozzles in place.

Trouble is, the nuts have a way of freezing tight. One plant figured on 36 hours down time to sledge them loose. Power impact wrenches couldn't be used: not enough room.

Then — SWENCH, the hand-operated impact wrench, came to the rescue. Seven impacts, and the first nut came free. Thirty minutes, and the entire job was done — at a saving of $4,000!

The amazing SWENCH works anywhere, carries its power built-in. Exerts many times the energy needed to pull the handle, smoothly and evenly: gives you more power with greater safety.

Six models cover bolt sizes from ½" to 2½". For the full story on SWENCH, how it works, what it costs, how it saves, see your local distributor, or write:

AD NO 22-35

A FEW DISTRIBUTOR TERRITORIES ARE STILL AVAILABLE

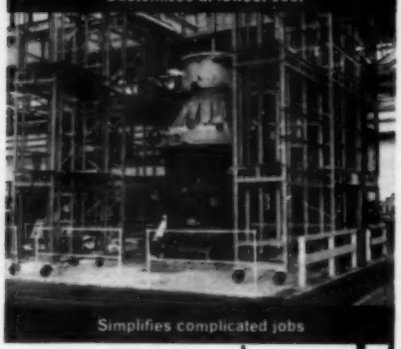
DISTRIBUTED IN CANADA BY:
CANADIAN CURTISS-WRIGHT LTD
TORONTO & MONTREAL CANADA

MARQUETTE DIVISION
CURTISS-WRIGHT
CORPORATION
1145 GALEWOOD DRIVE • CLEVELAND 10, OHIO

Circle 575 on postcard, page 33

HOW TO TIGHTEN UP ON FRAMING COSTS

Customizes at lowest cost



Simplifies complicated jobs

Also in "ready-to-assemble" kits

Acme Steel's AIM Brand Slotted Angle frames anything faster, easier, stronger . . . at less cost

Bring on any framing job—platforms, ladders, steps, work tables, benches, stands, conveyors, storage racks . . . even complete staging areas. Acme Steel Slotted Angle will tackle them all . . . complete them all with amazing speed, ease and material savings.

Simplicity is the secret. This rugged, galvanized steel do-all material is simply sheared to size with an AIM Brand Cutter and bolted together. The cutter and a wrench are the only tools needed. No drilling, sawing or welding. And Acme Steel's exclusive pattern of precision slots and holes aligns perfectly with opposite members. There's no figuring and finagling to fit pieces. Your men can master assembly in minutes. Obviously, manpower savings are tremendous.

AIM Brand's superior bolting pattern also gives you virtually unlimited design freedom, plus unparalleled structural rigidity.

All factors considered—initial cost, assembly savings, design versatility and 100% reusability potential—you'll come out way ahead with Acme Steel Slotted Angle.

NOW IN CONVENIENT "PRE-CUT" KITS. New AIM Brand Slotted Angle Kits offer over 250 types and sizes of storage units, die, sheet and bar stock racks, desks, tables, benches and carts. Nuts, bolts, accessories, instructions included. Send for facts.

ACME STEEL IDEA LEADER IN FRAMING

ACME STEEL COMPANY, Fabricated Materials Division, Dept. PES-111, 135th St. & Perry Ave., Chicago 27, Ill.

- ☐ Send new idea booklet on slotted angle.
- ☐ Send facts on new slotted angle kits.
- ☐ Send name of my nearest AIM Brand distributor.

*Name*_____

*Title*_____

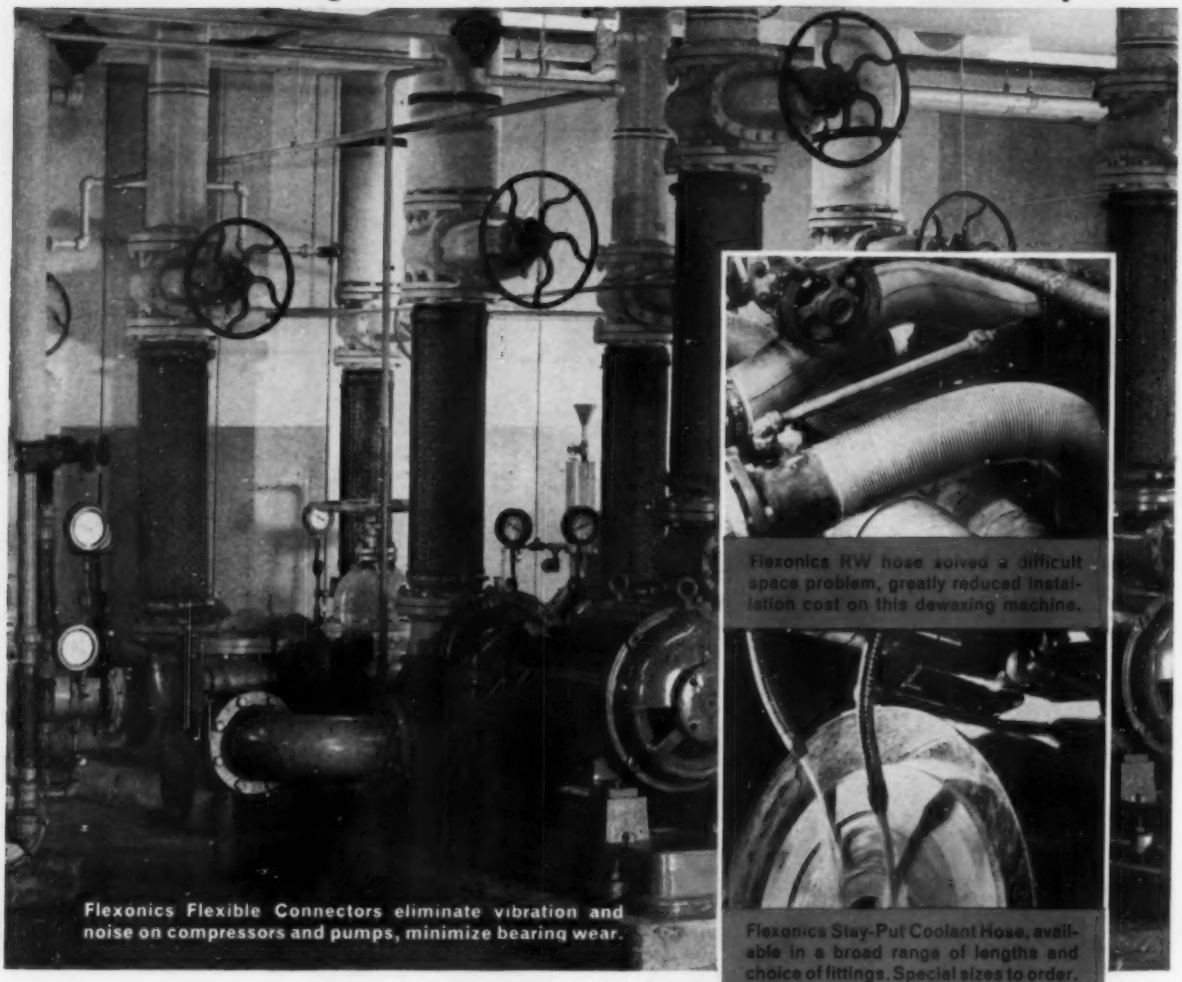
*Firm*_____

*Address*_____

*City*_____ *Zone*____ *State*____

Circle 576 on postcard, page 33

FLEXIBLE METAL HOSE . . . the practical solution to problems of vibration • misalignment • shock • thermal expansion • limited space



Flexonics Flexible Connectors eliminate vibration and noise on compressors and pumps, minimize bearing wear.

Flexonics RW hose solved a difficult space problem, greatly reduced installation cost on this dewaxing machine.

Flexonics Stay-Put Coolant Hose, available in a broad range of lengths and choice of fittings. Special sizes to order.

METAL HOSE CAN SAVE YOU MONEY, important money—by prolonging the life of your equipment . . . reducing piping installation costs . . . minimizing down time . . . eliminating noise. And for the broadest line of metal hose and fittings, the most advanced technical experience . . . and fine quality, depend on Flexonics—the most experienced name in metal hose. Your local Flexonics PMS distributor is a Pipe Motion Specialist. He carries a complete stock of hose and fittings, is equipped to fabricate complete assemblies to your specifications. Call him for fast, dependable service. If you prefer, use the coupon for your FREE copy of the Flexonics Metal Hose Design Guide.

FLEXONICS DISTRIBUTOR

PMS

PIPE
MOTION SPECIALIST

Flexonics

DIVISION OF CALUMET & HECLA, INC.
400 East Devon Avenue • Bartlett, Illinois

FLEXIBLE METAL and SYNTHETIC HOSE
EXPANSION JOINTS
BELLOWS • SPECIAL TUBULAR ASSEMBLIES

In CANADA
FLEXONICS CORPORATION OF CANADA, LTD.
BRAMPTON, ONTARIO

IN-490

ATTACH TO YOUR LETTERHEAD

Flexonics
400 East Devon
Bartlett, Illinois

Send free copy of
Flexonics Metal Hose
Product and Design Guide. Also send
the name of your local distributor.

Circle 577 on postcard, page 33

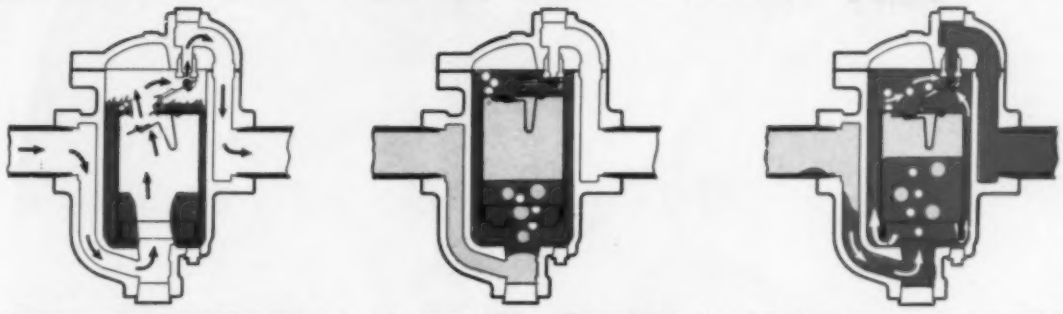
Just How Does an OF&T* Trap Differ from an Inverted Bucket Trap?

*Open Float and Thermostatic

A frank statement about the design and purpose of a trap with a confusing name

First, let's take a look at the way an OF&T trap works—

CONDENSATE | STEAM | STEAM BUBBLES | AIR BUBBLES | AIR FLOW | CONDENSATE FLOW



1. Steam pressure pushes air through large thermostatic vent and out through the trap discharge valve at full differential pressure between the supply and return line. Condensate formed by incoming steam also goes right through trap.

2. Steam reaches trap. Thermostatic vent closes. When ⅓rds full of steam bucket rises to close trap valve. Residual air and CO_2 now escape through standard vent at steam temperature.

3. Condensate arrives displacing steam causing bucket to lose buoyancy and pull on valve lever. Weight of bucket, multiplied by the leverage, opens the valve against steam pressure. Condensate is discharged until steam restores bucket buoyancy.

An Armstrong OF&T trap is an inverted bucket trap, but is does have some important differences:

1. An OF&T trap is equipped with a thermostatic vent for removal of large volumes of air encountered on start up.
2. Discharge orifices are sized to remove large volumes of condensate at low pressures (0-15 or 0-30 psi).
3. Pipe connections are oversized to meet piping requirements of low pressure intermittent service.

We felt these differences were sufficient to justify a new name—if only to simplify discussion, specifying and ordering. However, some of our friends and competitors have said that the OF&T trap was only an inverted bucket trap with a thermostatic vent. We take this as a compliment because our whole idea was to make the many proven advantages of Armstrong Inverted Bucket Traps conveniently available for low pressure service where large amounts of air are encountered on start-up. (We also figured we could sell more traps this way which we have.)

Inverted Bucket Advantages

CONTINUOUS VENTING— In addition to the big air venting capacity on start-up provided by the OF&T design, the basic inverted bucket principle provides continuous air venting after the trap is hot. Air and carbon dioxide escape through the fixed vent in the bucket and are discharged when the trap valve opens. This continuous venting of air and CO_2 is accomplished simply by the difference between the density of the steam-air-CO_2 mixture in the bucket and the density of the condensate surrounding the bucket. No cooling lag is required that would permit CO_2 to go into solution to form corrosive carbonic acid.

DIRT HANDLING — The turbulent flow of condensate under the edge of the inverted bucket and the fast sinking—fast floating action of the bucket keep dirt in suspension so that it is discharged along with the liquid. There is no likelihood of dirt lodging in the valve seat and no possibility of sludge accumulation on a bellows.

CORROSION RESISTANCE — The entire mechanism of Armstrong OF&T traps is economically fabricated from stainless steel—more corrosion resistant than parts usually used in other types of traps for low pressure intermittent service.

DEPENDABILITY — The ability of the OF&T trap to keep itself clean and the use of stainless steel parts contribute to dependability and long life. Unlike some other types of traps for this kind of service, OF&T traps "fail open"—a remote possibility but an important safety feature.

What Should You Do About It?

From our admittedly biased viewpoint we think that Armstrong OF&T traps should be used exclusively on low pressure intermittent service. This may not be so obvious from your viewpoint.

Nevertheless, we think it will be well worth your while to investigate OF&T traps for trapping requirements on low pressure unit heaters, preheat and reheat coils, converters, hot water generators, etc. The following printed material available on request will help you:

Catalog K — The inverted bucket story in detail.

Bulletin 252—Trapping Unit Heaters (including recommendations by make and model).

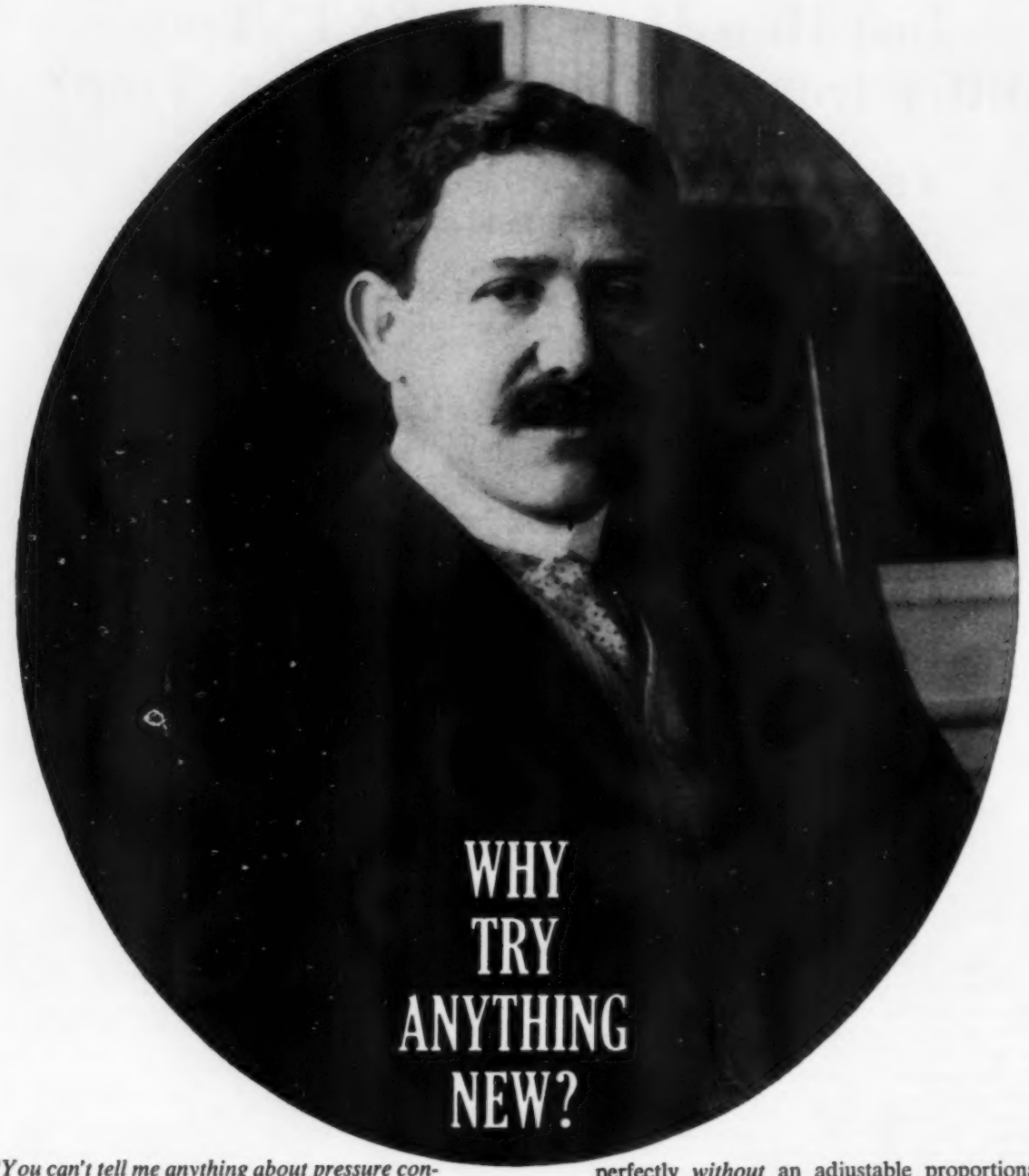
Bulletin 254—Draining and venting preheat and reheat coils.

Ask your Armstrong Representative or write: **Armstrong Machine Works, 9121 Maple Street, Three Rivers, Michigan.**

P.S. Just to humor us and for safer communication, we would appreciate it if you would refer to our inverted bucket traps with thermic vents and big pipe connections as Open Float and Thermostatic Traps.

ARMSTRONG STEAM TRAPS

113-ST



WHY TRY ANYTHING NEW?

"You can't tell me anything about pressure controllers. To claim that you can have stability without being plagued by a black box full of bourdon tubes, flapper-nozzles and reset contrivances is nonsense . . . plain nonsense!"

We disagree! It seems that in the bulk of pressure control systems with short lag factors, the adjustable proportional band and reset mechanisms serve chiefly as crutches. They do little more than compensate for a flapper valve's over-sensitivity to minor system disturbances. In this respect, they merely approach, without equalling, the *inherent* operating stability of the Leslie Control Pilot's forward design. (No flappers, no problems). This pilot functions perfectly *without* an adjustable proportional band in such systems.

There are instances, however, where it is prudent to specify an adjustable proportional band for a broader range of applicability. Here, your answer is a Leslie pressure pilot with a single knob proportional band adjustment. Used either as a controller or a transmitter, this combination is the leader among pressure pilots. Write today for details on fixed or adjustable proportional band Leslie Control Pilots, or both.

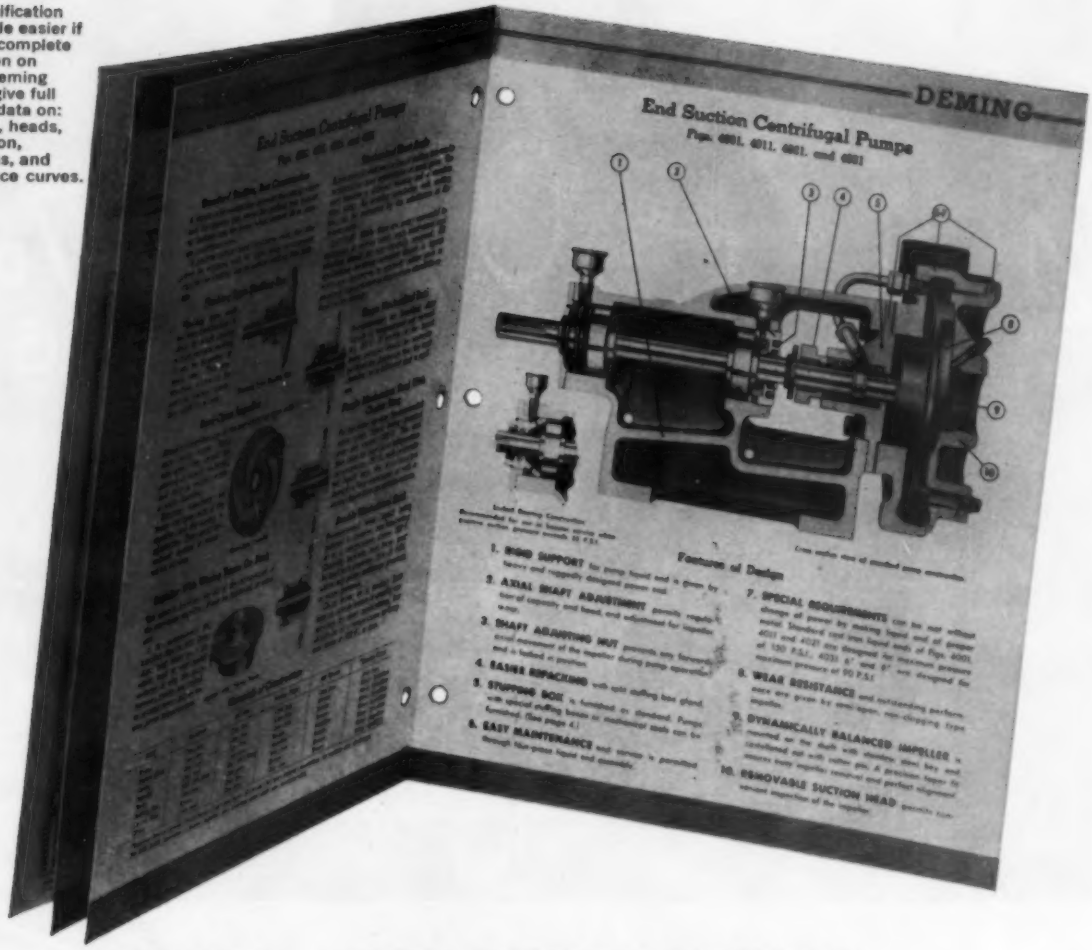
LESLIE REGULATORS AND CONTROLLERS

A SINGLE STANDARD OF QUALITY SINCE 1900

LESLIE CO., 707 GRANT AVE., LYNDHURST, NEW JERSEY

Circle 579 on postcard, page 33

Your specification job is made easier if you have complete information on pumps. Deming bulletins give full technical data on: capacities, heads, construction, dimensions, and performance curves.



NOW...SEE WHY DEMING can pump your liquids at lowest cost

Here is pump information you can use when it's time to talk pumps in your company . . . or when it's time to specify. Up-to-the-minute Deming Bulletins covering immersion process pumps, vertical turbines, centrifugals, rotaries and other Deming quality pumps show you specifically why a Deming will handle the job efficiently . . . and at lowest cost.

Is corrosion your big problem? Power cost? Space? Transfer loading? . . . Do you pump acids? Abrasive slurries? Asphalt thick mixtures? Xylene thin solvents?

Then send for the literature on the pumps that interest you. With more than 10,000 Deming pump types, capacities and sizes to choose from, you have good reason to make Deming your headquarters for pumps and pump information. Buyers throughout the country rely on Deming.

DEMING
DIVISION CRANE CO.
1148 Broadway • Salem, Ohio

Send the reply form now . . . and have the facts when you need them.

PLEASE SEND information on the following:

- ☐ Deming Vertical Turbines (or circle 738 on post card, page 33)
- ☐ Deming End Suction Centrifugal Pumps (or circle 739 on post card, page 33)
- ☐ Deming Sump Pumps (or circle 740 on post card, page 33)
- ☐ Deming Internal Gear Rotary Pumps (or circle 741 on post card, page 33)
- ☐ Deming Submersible Pumps (or circle 742 on post card, page 33)

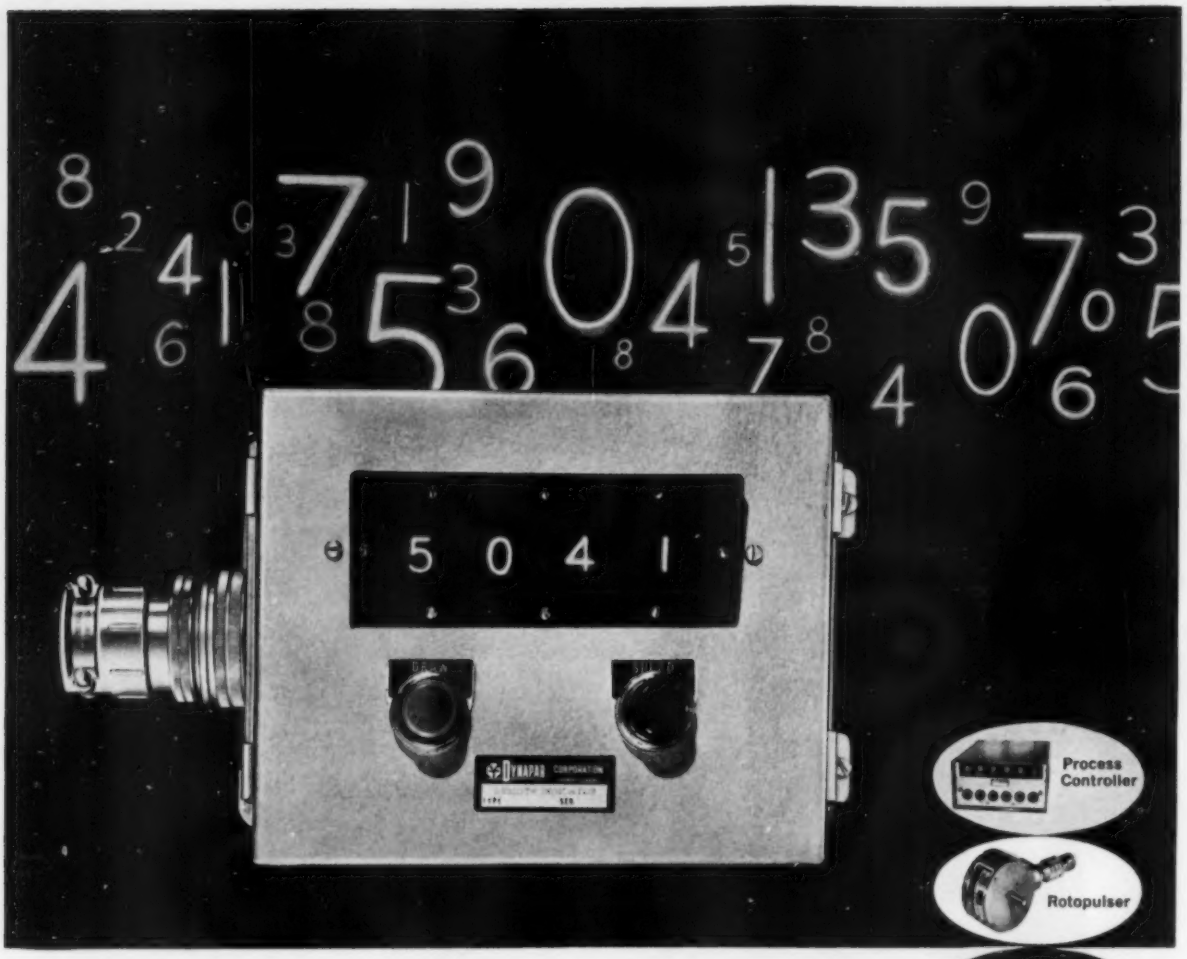
Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____



NOW...Louis Allis offers DYNAPAR* Digital Control Systems!

Louis Allis can supply accurate digital controls designed to industrial standards for a wide variety of continuous process lines

For any production process, Louis Allis can furnish not only motors, drives, and controls, but also digital monitoring equipment to provide visual readout and process control signals.

The answer is DYNAPAR Digital Control — a highly accurate digital logic system that can count, measure, totalize, indicate, time, or control depending on the requirements of the application. Digital systems are ideally suited for high speed counting — accurate measurement of speed and draw — automatic cutting-to-length — automatic positioning — and many other applications.

Dynapar's digital devices utilize precise pulses, and eliminate the drift inaccuracy inherent in magnitude-measuring analog systems. There's no need for constant calibration or adjustment. Pulses are reliably provided by rugged ROTOPULSERS, highly stable sensing and pulse generating devices—visual indication is obtained by easily-read luminous direct numerical readouts. Control functions are accomplished by a variety of special devices tailored to specific operations. All DYNAPAR equipment features the most modern solid-state transistorized circuitry to provide long-life operation without maintenance.

Investigate to see how Louis Allis-Dynapar equipment can increase production and cut waste by automating *your* process. Call your local Louis Allis District Office, or write to The Louis Allis Co., 434 E. Stewart Street, Milwaukee 1, Wisconsin.

*Dynapar Corporation is the electronic subsidiary of The Louis Allis Co.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

D-226

Circle 581 on postcard, page 33

POWELL PERFORMANCE PAYS OFF

Any way you look at it, Powell performance really pays off. Take "availability" for instance.

You'll find that Powell makes just about any type of valve you may need—for oil, water, gas, steam, air and corrosive fluid applications. The same holds true for virtually any temperature and pressure. What's more, you'll find Powell valves are available in industry's widest selection of bronze, iron, steel and special alloys—from aluminum to zirconium. (The fact is, Powell pioneered application of special alloys in valve design.)

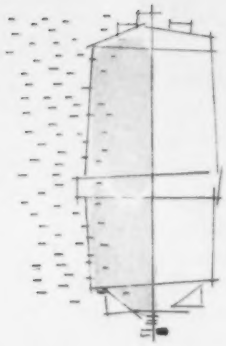
In short, you'll find Powell performance also includes outstanding availability—of exactly the type valve you need. And, since Powell maintains large stocks both at the factory and key points across the country—you get exactly what you need, when you need it. For further information, contact your nearby Powell Valve distributor or write The Wm. Powell Co., Cincinnati 22, Ohio.

115th year of manufacturing industrial valves for the free world

POWELL DEPENDABLE VALVES

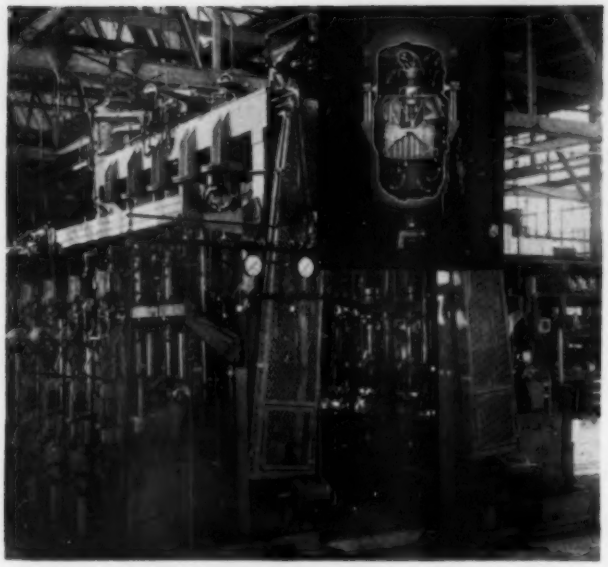
THE WM. POWELL COMPANY CINCINNATI 22, OHIO

Circle 582 on postcard, page 33



DOLLINGER
DRY FILTER
SPECIALISTS
FOR 40 YEARS

ELIMINATE DIRT FROM BOTTLE-FORMING OPERATION



Staynew Filters prevent air-borne dust and dirt from being blown into molten glass on bottle-forming machines of the Hartford-Empire Company Division of Emhart Mfg. Co., Hartford, Connecticut.

DOLLINGER STAYNEW FILTERS keep compressed air lines clean, help Hartford-Empire consistently produce a clearer, more perfect bottle with fewer rejects. Applied to air lines of bottle-forming machines, the filters remove moisture, dirt and dust particles down to five microns . . . or less than 0.0002 inches!

MICRO-FILTERING LIKE THIS is only part of the story. Hartford-Empire finds that Staynew Pipeline Filters offer the largest active filtering area in relation to the space occupied; they maintain low velocity and resistance to flow, thus helping to keep proper line pressures and save horsepower. Staynew Filters also eliminate the need for frequent cleaning; when cleaning is necessary, simple opening of swing bolts permits removal of filter element without breaking pipe connections.

DESIGNED FOR ANY TYPE OF SERVICE, Staynew Filters may be the answer to your filtration problem. Find out more information by talking to your Dollinger representative, or write for Bulletin 200. Dollinger Corporation, Industrial Products Division, 55 Centre Park, Rochester 3, New York.

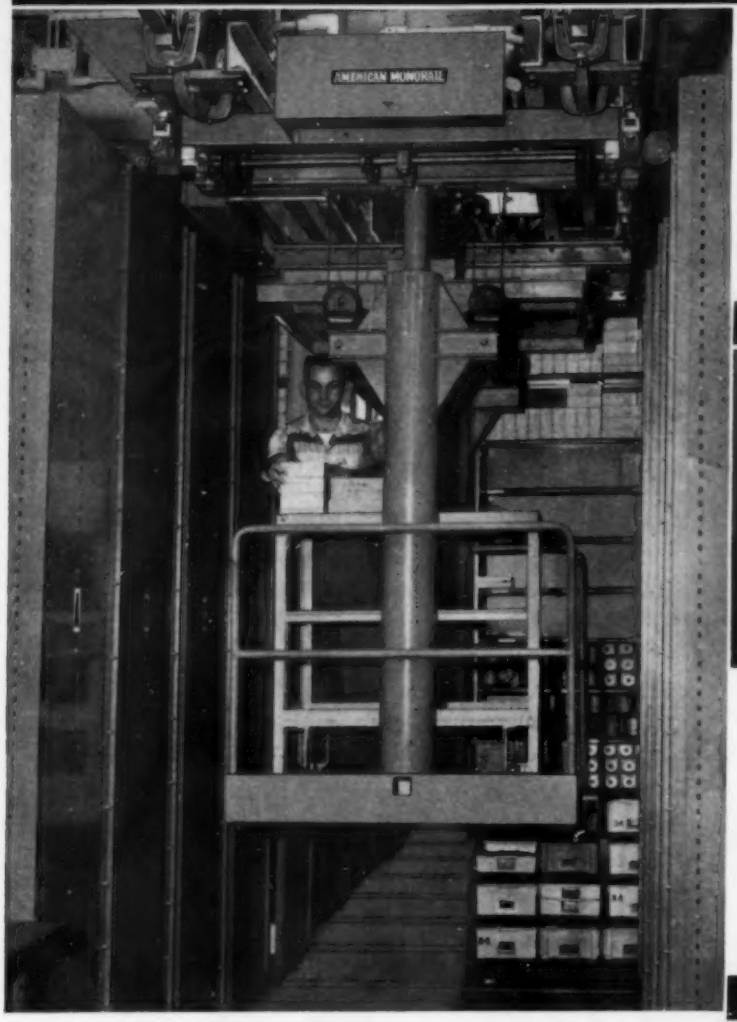
THE PROTECTOMOTOR
STAYNEW
FILTERS

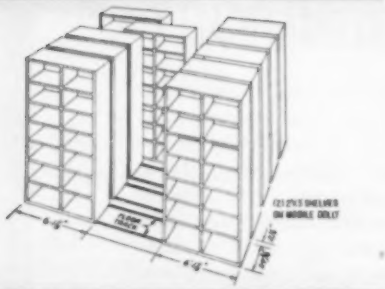
DOLLINGER

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS • HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

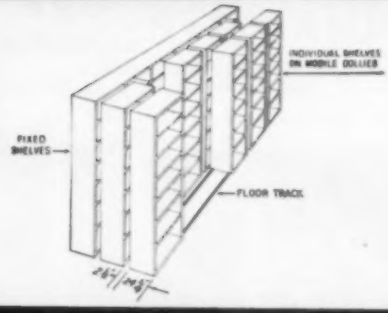
Circle 583 on postcard, page 33

LOOK MA...NO AISLES!





ACTIVE STORE ROOM



INACTIVE STORE ROOM

An American Monorail carrier plus mobile shelves added 7,500 sq. ft. of usable storage space to a Pennsylvania plant.

Ten foot high shelving units equipped with grooved wheel dollies ride on double rails mounted flush to the floor. Shelf units roll out into the aisle smoothly with a pull equal to 1% of their total weight. The Monorail carrier, used for loading and unloading shelves, has a photo cell safety device that prevents running into a shelf unit.

Major Benefits: Stock stays cleaner and the amount of space required for aisles is cut in half.

Free Folder — pictures and describes stacking by specialized American Monorail Stackers in many types of warehouses. Write for Bulletin SB-1.

ENGINEERED MATERIALS HANDLING

AMERICAN MONORAIL

1123 EAST 200th STREET CLEVELAND 17, OHIO

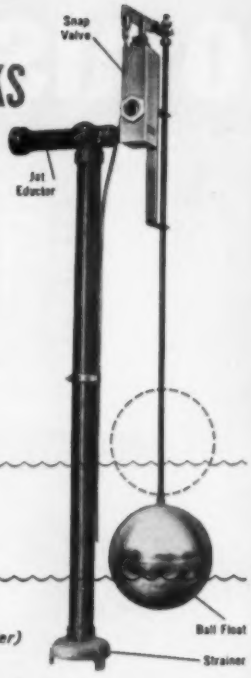
© A. M. Co. 1961

DIVISIONS: Conveyor Division, Tipp City, Ohio — Canadian Monorail Co., Ltd., Brampton, Ont.

Circle 584 on postcard, page 33

WATER-OPERATED SUMP PUMP WORKS AUTOMATICALLY

Ejector-type sump pump utilizes kinetic energy of water under pressure to evacuate liquids from sumps, tanks, pits. When liquid accumulates, ball float rises, opens snap valve to begin operation. When liquid level falls, float drops, closes valve and pumping stops. Steam-operated types also available. See below.

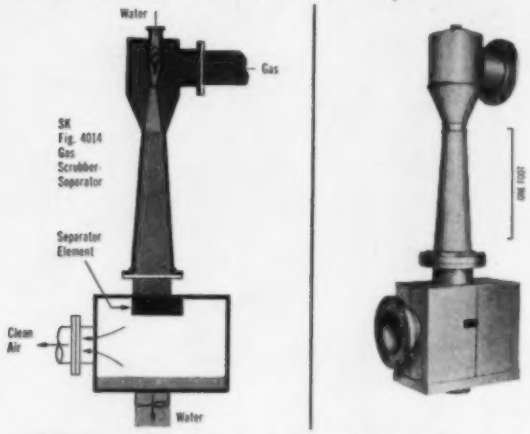


Ask for Bulletin 2M (water) or Bulletin 2A (steam)

or Circle 585 on reply card

SK Introduces New
GAS SCRUBBER-SEPARATOR

New "packaged" unit offers never-before-obtainable efficiency. Combines SK ejector-venturi scrubber with new separator which reduces liquid carryover to 0.00002 gal. per 100 cfm. Unit, called "Fig. 4014" is low cost, compact. Stocked in popular sizes for immediate shipment.



For details—ask for Bulletin Supplement 4R.

or Circle 586 on reply card

IMMEDIATE NEED?

Get a condenser from stock!

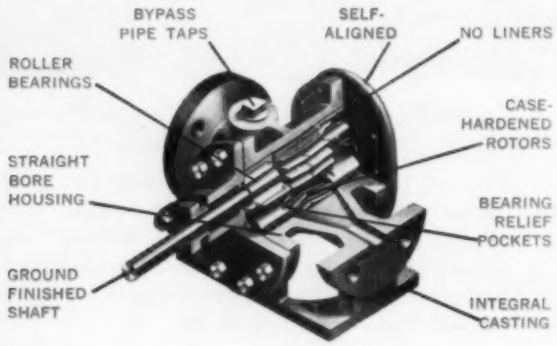
You'll have the condenser you need, *when you need it,* if you call on SK. We stock more types and sizes than any company in the business—and will ship immediately on receipt of your order.

For details—ask for Bulletin 5AA.

or Circle 587 on reply card

SK Gear Pumps for
DEPENDABLE PERFORMANCE

Most SK Gear Pumps are bought to solve "in-service" problems of performance or maintenance that were created by lower-cost competitive makes. Why not bypass this costly experimental phase by specifying quality-built SK Gear Pumps at the outset? Tell us about your application. We'll be glad to help.



For details—ask for Bulletin G-1.

or Circle 588 on reply card

JET APPARATUS: Ask for Condensed Bulletin J-1.
ROTAMETERS & FLOW INDICATORS: Ask for Condensed Bulletin M-1.
VALVES: Ask for Condensed Bulletin V-1.
HEAT TRANSFER APPARATUS: Ask for Condensed Bulletin HT-1.
GEAR PUMPS: Ask for Bulletin G-1.

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2279 State Road, Cornwells Heights, Bucks County, Pa.
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Hall Industrial Water Report

VOLUME 9 NOVEMBER 1961 NUMBER 3

Anything can happen

Or almost anything—in industrial plant water systems. Gravy gets into condensate, ammonia into cooling water, fuel oil into boiler feedwater, plating wastes into drinking water.

Serious trouble is always a potential result—blistered boiler tubes, heat exchanger shut-downs, wrecked turbines. But operating men are alert and usually notice that something has gone wrong. Working with them, the Hall field engineer, through training and experience, can quickly trace contamination to the source and recommend corrective measures, both immediate and long term.

Similarly, he can help you with all your water problems—boiler water, cooling water, service water, process and waste water.

Trouble can be beautiful

This crystalline deposit was beautiful to look at but caused plenty of trouble.

Deposition of calcium carbonate is quite normal when hard limestone water (temporary hardness) is heated. In this case, the plant's hot water piping was renewed *twice* in six years because of plugging. A water softener was the simple but complete answer to this particular problem.

Why high silica?

Excessively high boiler water silica concentration at an Eastern paper mill was the signal that something had gone wrong. Blowdown was increased in an attempt to reduce it and the call went out for Hall field engineer P. D. Cardillo.

What was the source of the silica? Cardillo found the concentration in the make-up water to be normal. Then the mill condensate was checked. It contained 10 ppm which could be accounted for only by contamination.

Continued checking of condensate samples from various sources finally narrowed the search to the hardwood mill. Here a leak was found in a heat exchanger in which bleach water containing 35 ppm silica was being heated. The silica was going back to the boiler in the heat exchanger condensate.

Training and experience, plus a silica test kit, quickly led Cardillo to the trouble point.

Unusual feed pump failure

When a food product plant in the east started the perfectly normal procedure of feeding sodium sulfite to the boiler feedwater to control corrosion, the unexpected happened. For some unknown reason, feed pump impellers began to fail rapidly from erosion.

The pump manufacturer was as thoroughly puzzled as the plant engineer who finally described the problem to Hall field engineer R. A. Beardsley. Following his own study, Beardsley recommended that the pump suction line be replaced. He reasoned that heavy, old corrosion products in the pipe were being loosened by the change in water conditions. Being abrasive they were accelerating wear, accounting for the failure of the pump impellers.

The pipe was replaced. With no repetition of trouble after more than a year of operation, Beardsley's reasoning was proved to be correct.

Poor samples

The operators in an oil refinery suddenly ran into trouble with the hot lime—hot zeolite softener. For no apparent reason, hardness of the effluent jumped to 2 gpg and repeated regenerations of the zeolite failed to produce any change.

Oil seepage around the manhole to the de-aerating section of the hot process softener indicated the possibility of oil fouling of the ion exchange resin. It was removed from the tank, washed with naphtha and put back. Hardness of treated water was still 2 gpg.

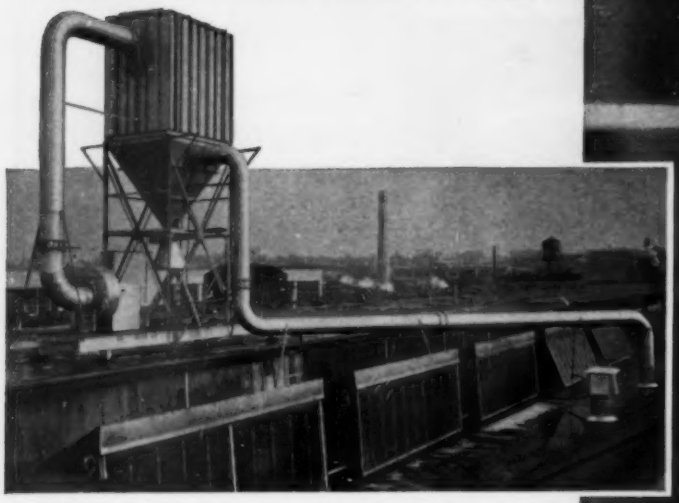
Although he felt that the resin should be replaced, the plant engineer called Hall field engineer D. C. Altenburger for a final check. Unconvinced that the resin was at fault, Altenburger, in five minutes, spotted what was wrong. Someone had opened a valve in the piping connecting the inlet and outlet pressure gauges on the hot zeolite softener. Samples taken from the connecting piping accordingly were a mixture of both hard and soft water. Closing the valve solved the only real problem—by providing true samples.

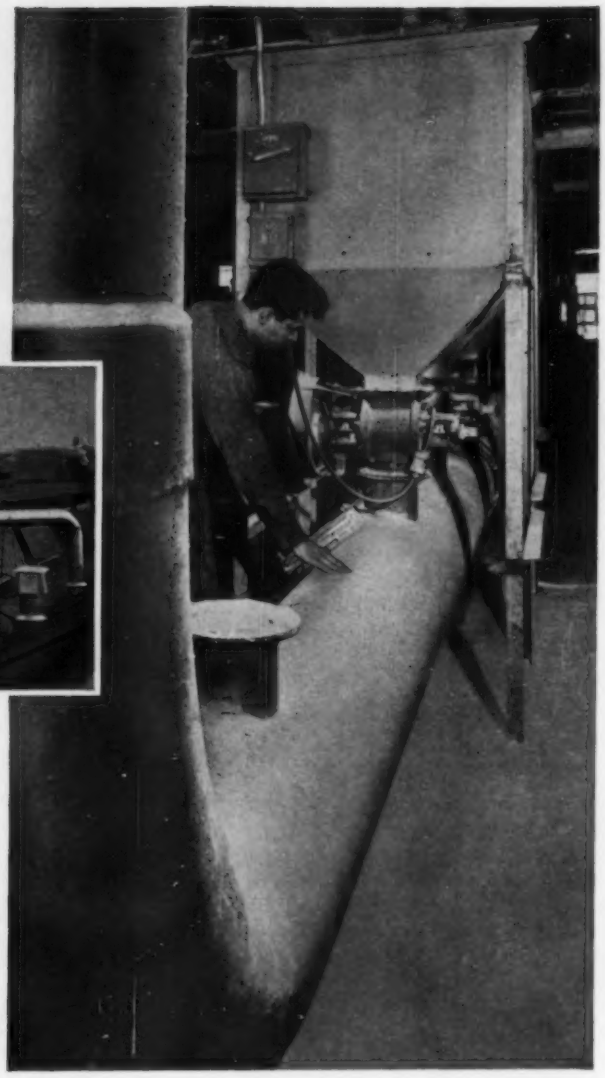
For your copy of 24-page brochure describing the many ways industry can use Hall Laboratories industrial water consulting services, write on your letterhead to:

HALL LABORATORIES
HAGAN CENTER, PITTSBURGH 30, PA.
Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

DIVISION OF **HAGAN** CHEMICALS & CONTROLS, INC.
Circle 589 on postcard, page 33

Blended PVC is discharged from surge tanks and cooled to 100°F. enroute to the roof-mounted Multi-Bag Filter by the air in the 18″ pipeline. Dracco also supplied Circle with an Airstream Conveyor which automatically moves PVC to maintain working levels in extruder hoppers.





creative engineering from Dracco:

one dust collector does three jobs

In terms of plant operation, modern stands for simple, time-saving, economical, serviceable. When a plant is being modernized, it often takes creative engineering to design equipment which fits this description.

Take the case at Circle Wire & Cable Corporation, for instance. The Circle plant in Maspeth, New York, extrudes cable sheathing made from PVC. Dracco engineers were asked to design a system which would modernize the existing operation of moving PVC compound from blending bins to a cooler, then storing it in 55-gallon drums for further handling to extruders.

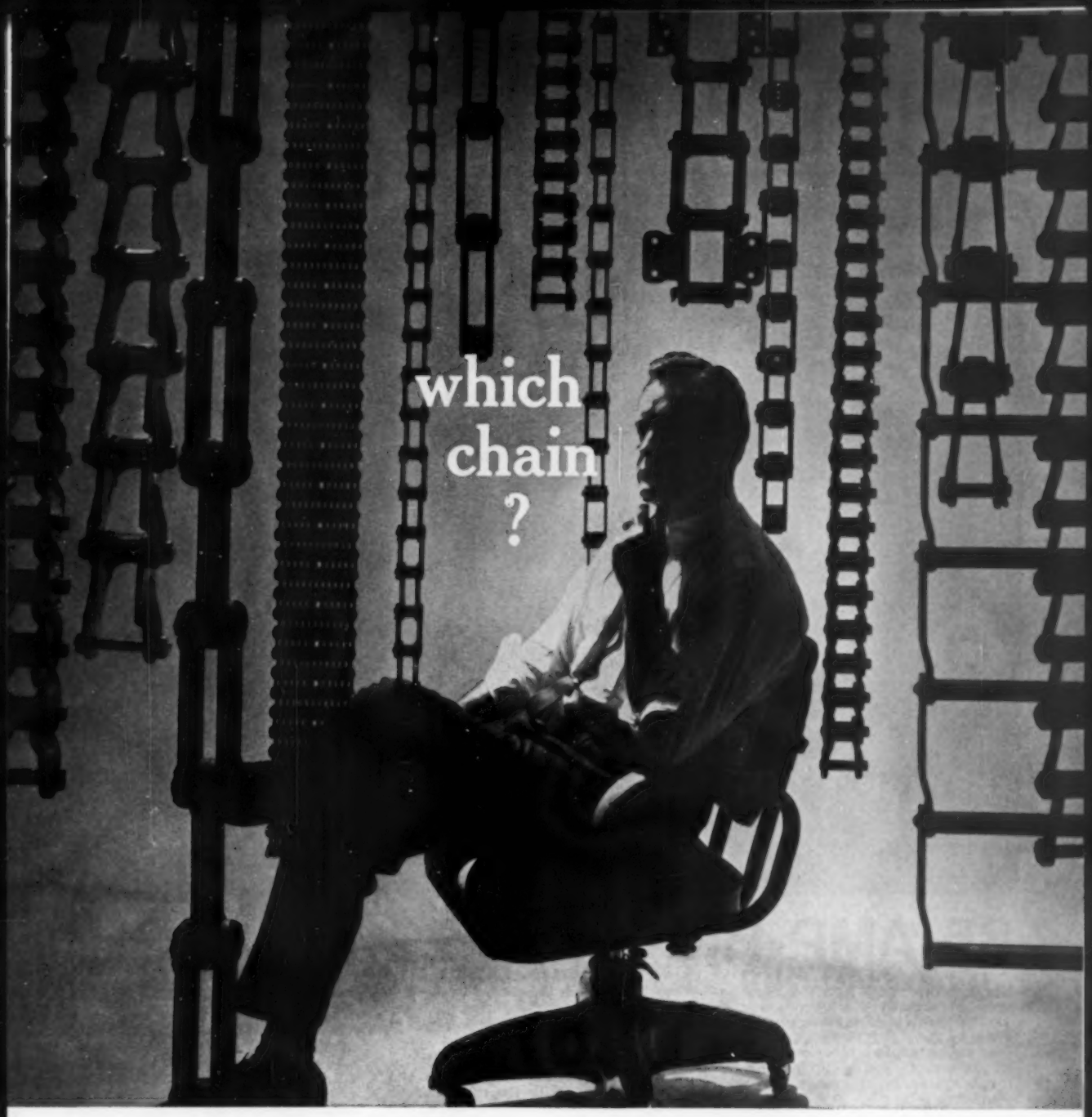
Here's the result: the cooling tank was eliminated; manual transfer of PVC compound from blender to cooler was also eliminated; and 55-gallon drums are no longer needed to store standard extrusion blend. In their place stands a Dracco Multi-Bag Filter with an 18″ intake line. The air in the line conveys the blend and, as an extra feature, cools it enroute. The filter collects the compound and discharges it to a ready bin for further conveying to extruder hoppers. Continuous flow of material improves quality . . . elimination of extra equipment and manual handling saves space and cost.

If you are modernizing a process involving dry bulk handling or dust control, take advantage of Dracco's creative engineering. For more information, call or write Dracco Division of Fuller Company, Harvard Avenue at East 116th Street, Cleveland 5, Ohio.

DRACCO *airstream* conveyors
dust control equipment

FULLER COMPANY

Circle 590 on postcard, page 33



save your time...ask Link-Belt

OFFERING YOU HUNDREDS OF STANDARD CHAINS—Link-Belt can help you choose the one chain that's precisely *right* for your power transmission or conveying application. Each chain is as individual as a thumbprint, with characteristics mated to specific job needs. And Link-Belt experience is at your service—to help you evaluate particular performance factors . . . to save you time in choosing the one best chain for your application (in terms of high efficiency, low *total* cost). Contact your nearby Link-Belt district office or authorized stock-carrying distributor. Ask for catalog 1050 covering the complete line of Link-Belt products and components for materials handling and power transmission.

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15,714

Circle 591 on postcard, page 33

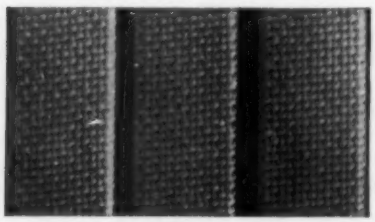
EXIDE POWER PACKAGE

Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa. (ESB)

85 AMP-HR—ONLY 22⅝ in. HIGH!

Here's the new high in battery capacity for electric industrial trucks—the Exide-Ironclad TSC Battery. It is available right now and it will fit in the battery compartments of your present trucks without modification. It conforms to the design thinking for future trucks as expressed by truck manufacturers.

This battery offers a capacity of 85 amp-hr per positive plate—increased from the previous highest available capacity of 80 amp-hr in the Exide-Ironclad TGS—and still with over-all height of 22⅝ in. The length and width dimensions of the battery are also unchanged. Therefore the new battery occupies the same space as present batteries.



New tubing boosts battery capacity

Side view of tubing magnified twice size shows the fine mesh with thousands of pores for easy flow of electrolyte. Holds active material firmly against loss.

A unique feature of the Exide-Ironclad Battery is the tubular construction of the positive plates. With the square-shaped tube, introduced over a year ago in the TGS Battery, Exide made it possible to get higher capacity from each positive plate through greater area in contact with the electrolyte.

Now, in the TSC Battery, Exide introduces woven mesh tubing, still square shaped, but with higher porosity for easier access of electrolyte. This new tubing is able to hold more active material, which, in addition to the higher porosity, results in higher capacity than ever before. The tubing is of a special nonoxidizing material of proven long life in extensive laboratory tests and field applications.

This increase in battery capacity has been achieved without increasing the height of the battery. Thus you can step up the work capacity of your present trucks without the extra expense of modifying the battery compartments. The Exide-Ironclad TSC is still only 22⅝ in. high. Likewise its specific gravity is still only 1.275. Hence battery life potential remains high.

With the introduction of the Exide-Ironclad TSC, Exide now makes it possible for you to match your particular battery power requirements more closely than ever. If you are ready to buy a new truck or new battery now, talk with your Exide representative about how you can get the maximum power for your dollar.

Only Exide offers so broad a range of battery types: Exide-Ironclad, Exide-Powerclad premium flat plate, and Exide Nickel-iron alkaline (invented by Thomas A. Edison). Exide chargers are available in both motor-generator and silicon rectifier types, in sizes to cover all needs. Exide service men are coast to coast, all factory trained in both batteries and chargers.

Make sure you get maximum economy in your battery power. Write Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

Exide®

Circle 592 on postcard, page 33

Circle 593 on postcard, page 33 →

"These 'beehives' are a boon to our research"

... The Mead Corporation, Chillicothe, Ohio

"These Ilg L-CRF centrifugal fan roof ventilators (all 38 of them) play a part in our research activities," says Al Heierman, research engineer for The Mead Corporation, Chillicothe, Ohio.

"We *won't*, of course, describe the various processes these roof ventilators exhaust from. Neither will we claim that our research projects are successful merely because of these fans.

"We *are* happy to tell you that Ilg fans remove a number of obnoxious odors, keep our testing areas fume-free and, in general, help keep production high while making Mead a better place to work."

ILG®

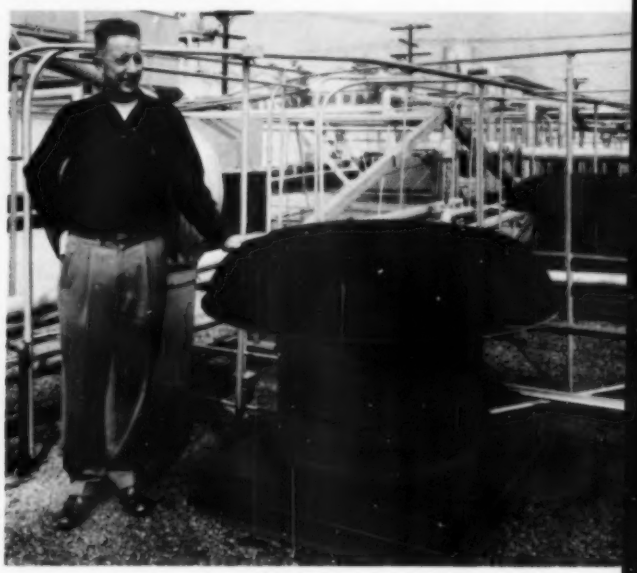
ILG ELECTRIC VENTILATING CO.

2832 N. Pulaski Road, Chicago 41, Ill.
Offices in 60 Principal Cities
Member of Air Moving and Conditioning Association, Inc. (AMCA)

Here's why power roof ventilators satisfy so many

Pinpointing Patented Pressure Cooling. Ilg-built backward curved aluminum airfoil fan wheel with patented backplate fins pulls cool air into motor compartment and *through the motor* to protect against build-up of heat from sun . . . *increases motor life expectancy up to four times that of ordinary units.* Fifteen sizes to choose from for capacities from 155 to 27,290 cfm. WRITE FOR CATALOG DB3-200.

Upblast Roof Ventilators with butterfly dampers provide high-speed, vertical exhaust. Airfoil-design propeller blades (in five sizes from 24" to 48") are direct-connected to Ilg-built totally enclosed motors. A choice of five sizes for capacities from 5060 to 33,300 cfm. WRITE FOR CATALOG DB3-300.



Low in Height . . . High in Performance. Ilg L-LSQ propeller fan power roof ventilators feature direct-connected, patented "Q" fan wheels that pass air over blade smoothly, quietly. Low starting torque of Ilg 3-phase and permanent-split capacitor, single-phase motors eliminates starting shock, lengthens fan life. Eleven sizes to choose from for capacity range of 287 to 26,500 cfm—at pressures from 0" to ⅛". WRITE FOR CATALOG DB3-100.

ILG ELECTRIC VENTILATING CO.

2832 N. Pulaski Road, Chicago 41, Ill.

Offices in 60 Principal Cities

Member of Air Moving and Conditioning Association, Inc. (AMCA)

this patented

CLIP and STUD

makes LYON your BEST SHELVING INVESTMENT

Design makes the difference! Don't settle for less than the exclusive Lyon CLIP and STUD which many have tried to copy but none can duplicate. Fully protected by Government patents, Lyon CLIP and STUD obsoletes conventional steel shelving and guarantees you these *extra dividends*—

★ Easy, fast, low cost assembly.

★ Complete flexibility—shelves instantly adjustable from the front without use of nuts, bolts or tools.

★ Tremendous structural strength and rigidity.

Another extra dividend from Lyon—oldest and leading steel shelving manufacturer—an experienced Lyon Storage Engineer and Lyon Dealer as near as your phone—ready to help you save space, time, money.

Factories in Aurora, Ill.—York, Pa.—Los Angeles

There are many types of Lyon steel shelving. Above—a mezzanine (double decked) stockroom in which the lower installation supports the entire second floor. A big saver of valuable floor space.

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For Business, Industry and Institutions

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LYON METAL PRODUCTS, INC.
1191 Monroe Avenue, Aurora, Illinois

☐ I would like to see a Lyon CLIP and STUD demonstration.

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A PARTIAL LIST OF LYON PRODUCTS

• Desks	• Storage Cabinets	• Bookcases	• Folding Chairs	• Sorting Files	• Tool Stands	• Cabinet Benches	• Display Equipment
• Tables	• Flat Drawer Files	• Coat Racks	• Service Carts	• Hopper Bins	• Tool Boxes	• Revolving Bins	• Hanging Cabinets
• Stools	• Drawing Tables	• Shelving	• Work Benches	• Drawer Units	• Parts Cases	• Toolroom Equip.	• Slotted Angle
• Lockers	• Filing Cabinets	• Bin Units	• Bench Drawers	• Shop Boxes	• Bar Racks	• Service Counters	• Wood Working Benches

Circle 594 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

Edited by M. E. Heniken

Use the Reader Service Cards provided on pages 33-34 to ask for more information on this equipment. Circle item numbers of the products in which you are interested.

URETHANE ROOF PANEL provides maximum insulation

Urethane roof panel insulation is announced as weighing one-fourth less, and being twice as efficient and easier to handle than conventional-type insulation. Consisting of rigid urethane foam honeycombed with tiny closed cells, with tough roofing membranes laminated on both sides, it is said to provide an insulating value better than still air. An inch of it has the same insulating capability as 2-in. polystyrene or fiber glass, or 2½-in. fiberboard roof insulation, manufacturer states. The panels measure 3-by-4 ft. Other features include non-absorbency

of water or bitumen, an immediate "work-on, walk-on" surface, application directly in hot bitumen. Barrett Div., Allied Chemical Corp.

For details, circle 1 on Post Card

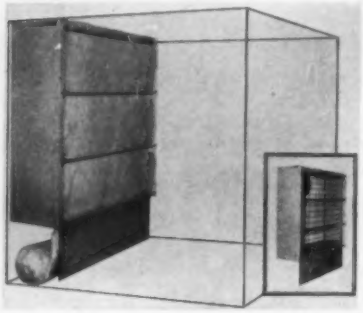
OIL LEVEL GAGE for use with fire resistant fluids

Model 8575-NON is a non-inflammable oil gage for use with synthetic, emulsion, or water-based, fire resistant fluids. Featuring simple two-hole installation, it may be mounted on thin or thick walled tanks, has clearly visible oil level markings. It is interchangeable with company's standard Model 8575 oil level gage. Century Hydraulics, Div. Century-Detroit.

For details, circle 2 on Post Card

OVERSPRAY FILTER uses low-maintenance roll media

Paintstop uses pull-up type media in rolls to cover filter section in one piece. Used media is cut off, folded and disposed of readily. Media can be changed in seconds and frequent cleaning of ducts and fans is unnecessary. System is built in sizes to fit standard spray painting dry booths or



tunnel type booths. It has no water, pumps, valves or nozzles; can be used on varnish, lacquers and enamels, polyurethane, glass fibers, foam materials. E. F. Vilter Co.

For details, circle 3 on Post Card

MAGNETIC HOLD SWITCH has built-in solenoid

Electrical release from a remote location is possible with this small magnetic hold-in switch. When toggle lever is operated and solenoid energized, the lever stays in actuated position until released manually or electrically by de-energizing solenoid. Enclosure is filled with inert gas under pressure to assure constant operating characteristics regardless of atmospheric pressure variations. Turret type terminals permit easy solder connections. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

For details, circle 4 on Post Card

TEFLON STEAM JETS for continuous pickling lines

Service records of these acid-proof steam jets are said to reveal more than 4 yr of use with no sign of corrosion, damage or steam erosion. The Teflon jets are available to fit all continuous pickling lines, come in three configurations. Crane Packing Co.

For details, circle 5 on Post Card

THAWING PELLETS work fast, leave no residue

Flex Melt, claimed to have 30 times more thawing power than salt, and 10 times more than flake calcium chloride, swiftly removes ice and snow and leaves no residue or deposit to be tracked inside. Consisting of heat-generating pellets, it goes to work immediately upon contact, says manufacturer, and there's no danger to vegetation, rubber tires, shoes, asphalt or concrete. Flexrock Co.

For details, circle 6 on Post Card

COAL BOILER offers automatic operation, economy

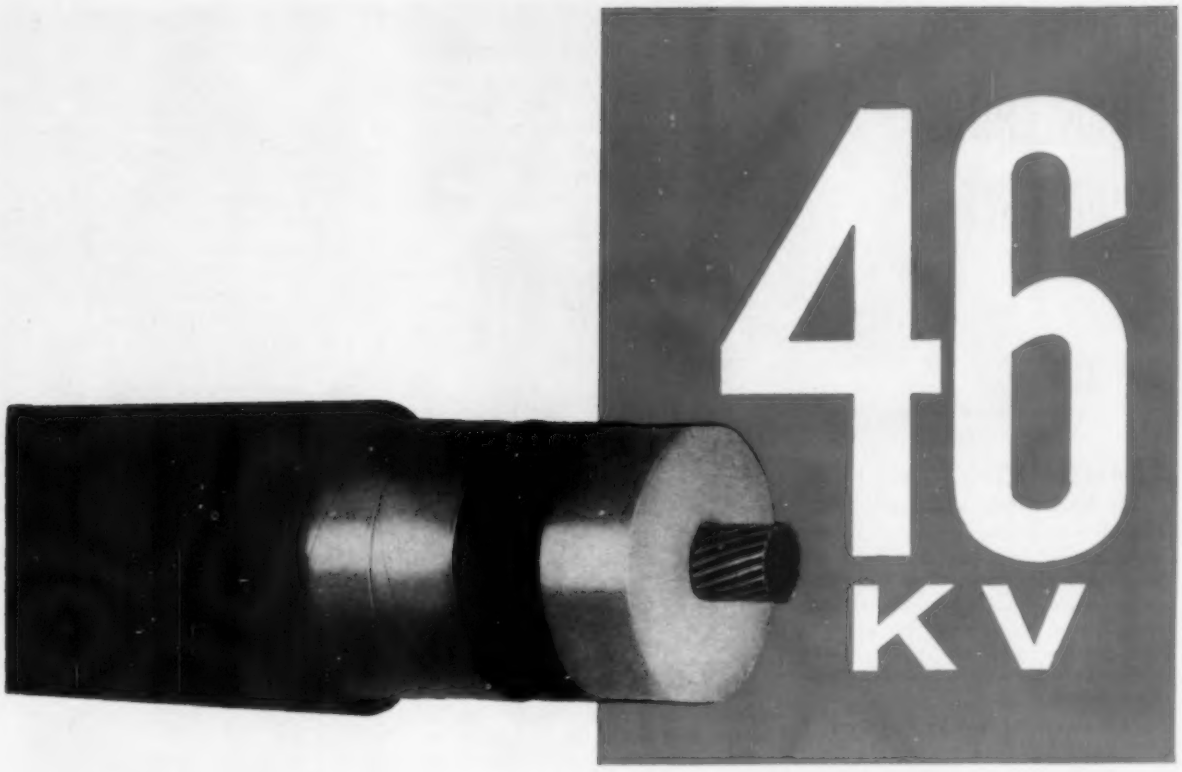
The Powr-Matic, developed for industrial use, is a fully automatic, bituminous coal-fired packaged steam generator in sizes from 70 to 300 hp. Stoker, integrated control system and coal and ash conveyors are part of the "package". Operation is controlled by changes in load demand. At the suggestion of a bin level control, coal is transferred from the bin to a storage hopper at the front of the boiler. Electronic controls attached

to the steam or hot water lines signal the stoker mechanism to feed fuel. When boiler needs are met, controls cause stoker equipment to slow down or stand by until more fuel is needed. At the rear of the furnace, ash is dribbled into an enclosed container or conveyed outside the building. The unit can be operated at 10 to 100 per cent capacity. Combined with converter, it can air-condition a building. Two units are shown in the photo—any number may be operated in tandam. Bulletin 161 gives details. Canton Stoker Corp.

For details, circle 7 on Post Card

FHP MANUAL STARTER protects two-speed motors

Overload protection for both speeds on single-phase two-speed motors is provided with this fractional horsepower manual starter. Motor switch features a single, rotating operating knob with "High-Off-Low" legend for speed selection and reset after overload. Unit is furnished with four types of mounting—NEMA 1 surface, flush



POLYETHYLENE
INSULATED POWER CABLES

Now SIMPLEX technology brings polyethylene's outstanding characteristics to higher voltage applications.

- Proved in Performance
- Economical
- Low Weight
- At least seven-fold improvement in voltage life of polyethylene
- Specific Inductive Capacity Less than 2.5
- Power Factor Less than .001
- High Impulse Strength
- For Wet, Dry, Overhead and Underground Installations

Send for complete details

POLYETHYLENE CABLES BY Simplex WIRE & CABLE CO.

EXECUTIVE OFFICES: Cambridge, Massachusetts • PLANTS at Cambridge, Massachusetts and Portsmouth, New Hampshire

Circle 595 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

panel, machine cavity, and plaster cover mounting in standard 4-in. square box; with or without pilot lights. Cutler-Hammer, Inc.

For details, circle 8 on Post Card

TRANSMISSION BELTING for hazardous atmospheres

Non-el-Stat Belting has a conductive layer bonded into the belt itself for permanent anti-static effect. Applications range from chemical installations having highly explosive gases to food processing plants whose atmospheres are filled with combustible dusts. Extremultus, Inc.

For details, circle 9 on Post Card

HEATER ASSEMBLIES use one to four duct furnaces

The PAK Series Assemblies consist of one to four DS Series duct furnaces together with complementary packaged blowers, mechanical flue exhauster, and control system for unlimited applications in heating, heating and cooling, partial fresh air and total make-up air, processing and similar systems. Four models range in capacity from 200,000 Btu to 1,400,000 Btu input, are assembled in push-through or pull-through arrangement. (Models range from PAK 1 using single furnace and blower assembly to PAK 4 using dual blower assembly attached to four furnaces). All components are bolted to heavy angle iron bases, forming a single unit. Reznor Mfg. Co.

For details, circle 10 on Post Card

SPHERICAL TANK offers corrosion-resistance, strength

Chemisphere, a low-cost tank fabricated from glass-reinforced polyester, is suggested for processing and storing corrosive chemicals for chemical, metals, petroleum and other industries. Its round shape provides minimum

surface area per unit of volume and stress concentrations, achieving high strength-to-weight ratio. Also easier cleaning and drainage result. Corrosion resistance is provided by a bisphenol A polyester resin (Atlac 382) barrier coat and a top surface of filament-wound glass fiber inpregnated with polyester resin. A 6-ft model (847 gal) and an 8-ft model (2009 gal) are available, with manhole, fittings. Justin Enterprises, Inc.

For details, circle 11 on Post Card

PLASTIC BOND welds new concrete to old

Power-Grip Concrete Bond is said to eliminate roughening, chipping, drilling, scarifying and washing procedures when old concrete bases need repair or resurfacing with new concrete. It can also be used in concrete mix to increase resiliency, cohesion and adhesion, as well as tensile and compressive strengths, making concrete resistive to abrasion, impact, oil and grease. The Monroe Co., Inc.

For details, circle 12 on Post Card

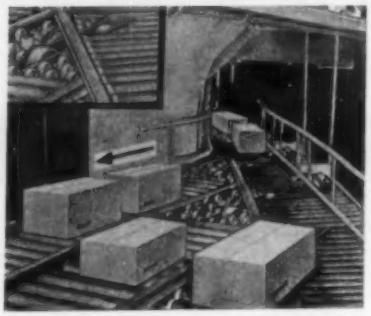
PORTABLE WINCH weighs 6 lb, can lift a ton

Mighty Muscle, a compact winch for manual lifting and pulling jobs, can be operated by one person. For moving equipment, tightening assembly line chains, bending metal etc., it is said to be an improvement over block and tackle, and more versatile. A spring-actuated pawl and ratchet serves to provide safety, yet gives free release when desired. Housing is aluminum alloy, and the sturdy handle fits into eight position holes. Gra-Tite Mfg. Div., Gray Properties, Inc.

For details, circle 14 on Post Card

CONVEYOR DIVERTER keeps closely-spaced cartons moving

Atronic Hi-Speed Diverter is designed to automatically divert cartons or containers from a main conveyor onto predetermined spur accumulator lines with negligible shock to cartons and without disturbing closely-spaced conveyor flow. Low shock feature permits movement of cartons with fragile contents,

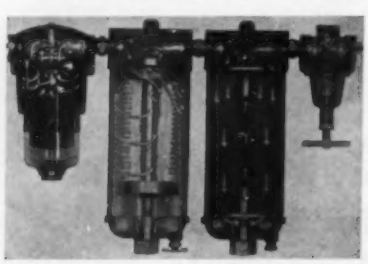


(bottles and jars etc.) at high conveyor speeds. The fact that cartons can touch each other permits rapid handling, and conveyor can handle various sized cartons simultaneously. Divert mechanism consists of two continuously rotating rubber tire wheels, one of which raises and lowers, and a bank of small metal roller wheels. At predetermined stations, one of the routing systems which identify different station codes on containers actuates proper diverter. General Atronics Corp.

For details, circle 15 on Post Card

COMPRESSED AIR DEHYDRATOR removes dirt and oil

Packaged as a single unit, this compressed air dehydrator assembly does not require draining, since the first

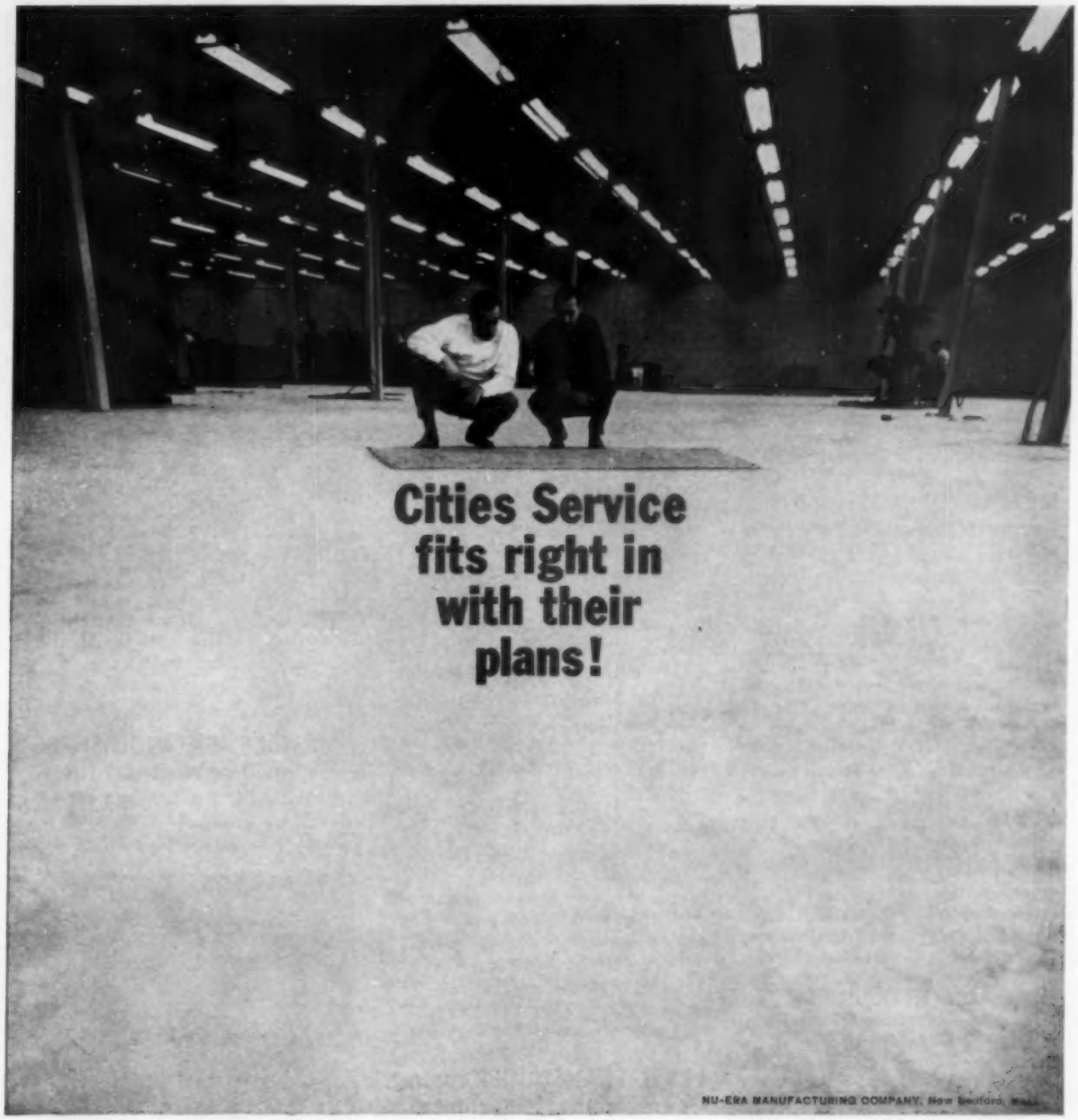


stage has a moisture separator with built-in automatic drain. Second stage is a filter that removes dirt and oil fumes. Following this is a stage for lowering oil or moisture dew point. A regulator on outlet controls air pressure. Rated at maximum of 10 scfm at 100 psi, unit can lower dew point to -100 F and remove oil to 2 ppm. No electrical or water connections are necessary. Transparent shell with color-coded chart shows state of desiccant. Wilkerson Corp.

For details, circle 13 on Post Card

EMULSIFIED DRESSING reduces pavement deterioration

An emulsified pavement dressing and refinisher, Revere Pavement Sealer resaturates dried, lifeless and spalling asphalt and black-top pavements with natural oils. It resists gasoline, oil, petroleum solvents and drippings which deteriorate pavement surfaces, protecting and sealing out moisture seepage and dust infiltration. Formulated from coal tar pitch, the product



There's a bright future ahead for Nu-Era, manufacturer of replacement gears. The firm recently built this huge plant to handle increased orders... and Cities Service definitely fits in with their plans. Says General Manager Bill Rebone, "At first, all cutting oil brands seemed to be the same. However, we soon realized that Cities Service oils were giving us superior performance in every respect. Most of our gears are made of #5135 steel, a real tough customer to work with. Yet, we find we're getting long tool life, extra clean cuts with Cities Service Chillo 30 Cutting Oil." Nu-Era now relies, exclusively, on Cities Service for their metal machining fluids. Find out how Cities Service can fit in with your plans. Simply contact your nearest Cities Service office or write: Cities Service Oil Company, 60 Wall Street, N.Y. 5, N.Y.

CITIES SERVICE

Out Front in Quality... Out Front in Service, too!

Circle 596 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

waterproofs, seals and rebonds pavement aggregates, forming a seamless blanket of protection against temperature extremes and pavement shifting. The resaturated pavement becomes pliable and resistant to normal expansion. Revere Chemical Corp.

For details, circle 16 on Post Card

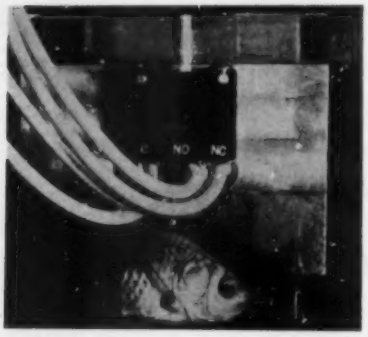
METERS for timing of service, preventive maintenance

Big Look Type 236 Elapsed Time Meter has six counters, measuring to 99999.9 in minutes or hours, enclosed in dust-and moisture-resistant cases. Ratings are 120 to 480 v, for 50 or 60 c. The instrument is built in 2½- and 3½-in. models for panel mounting and in 2½-in. models for conduit-type case or portable stand. Sealed models are available. General Electric Co.

For details, circle 17 on Post Card

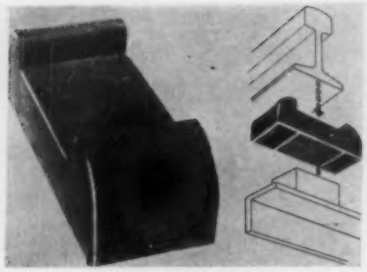
LIMIT SWITCH is low cost, water-tight type

This snap-action limit switch is designed for food processing and other applications involving washing, steaming or highly humid environments. Key element is Delrin plunger, sealed in Neoprene boot with nylon outer case. Switch is available with wire leads potted in epoxy resin or spade terminals. (Manufacturer points out that while switches like this aren't



normally operated under water, the one shown with the fish was actuated 200,000 times with full overtravel under 1 in. head of water without leaking.) Controls Co. of America.

For details, circle 18 on Post Card



RAIL INSULATORS of fiber glass reinforced polyester

These insulating supports for exposed third rails of overhead cranes and other heavy-duty conductor-rail handling equipment offer high impact strength and resist carbon tracking caused by arcing from third rail. They also bear up under strain of thermal expansion and contraction on long continuous installations. Cored construction simpifies installation. (As illustrated, third rail rests in depression in top of insulator). Insulators are for 40- and 85-lb systems. The Glastic Corp.

For details, circle 19 on Post Card

CUP BRUSHES, lock-riveted, for heavy-duty service

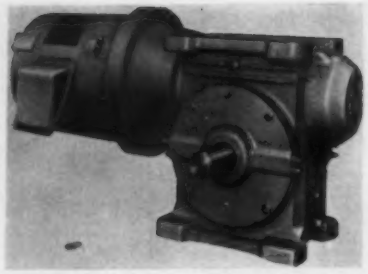
Heavy-duty cup brushes for use on high speed pneumatic and electric-portable tools have all brush parts riveted together as a unit to resist slippage, provide better drive and brushing action. Threaded and plain arbor holes are available. Cups with plain arbor holes have a hex-shaped recess on inside of brush which permits spindle retaining nut to seat, locking brush to tool spindle for additional safety. Brushes come with various gage wire, removable steel bridles. Pittsburgh Plate Glass Co.

For details, circle 20 on Post Card

LEVEL TRANSDUCER converts to electrical resistance

Model DLR Modulevel Precision Level Transducer measures liquid level and converts it directly to an electrical resistance. For general industrial use, it provides an inexpensive electrical level-sensing device for open or pressure vessels. It uses a frictionless magnetic coupling to transmit motion from level changes in vessel to contact wiper movement on potentiometer winding. Primary level change is sensed by a range displacer suspended in liquid by means of an expansion spring. Transducer may be used with resistance-type reading instruments for remote level indication, alarm, recording or control or to tie in to computer systems. Magnetrol, Inc.

For details, circle 21 on Post Card



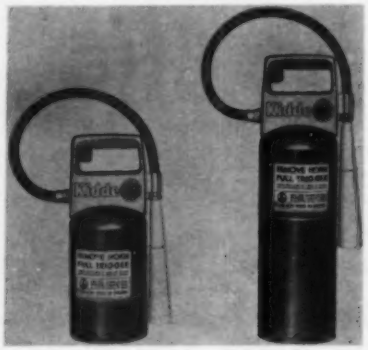
GEARMOTORS have single-reduction worm gearing

Type W Right-Angle Gearmotors are for use with apparatus driven by belts, chains or spur gearing, as well as through couplings. Single-reduction worm gearing offers high-ratio reduction with few moving parts in a close-coupled compact drive. Right-angle drive arrangement requires minimum of space, and involute helicoid thread form used with the gearing gives high load capacity and efficiency. Available in both a-c and d-c integral types, unit comes with a-c motors in NEMA frame size 1 to 20 hp or with d-c motors in 1 to 15 hp. Westinghouse Electric Corp.

For details, circle 22 on Post Card

PORTABLE EXTINGUISHERS for liquid or electrical fires

Tri-Class-ABC Extinguishers are approved for use on all three kinds of fire (Class A—wood, paper, cloth;



Class B—flammable liquids; and Class C—electrical). The 10-and 20-lb portable units bear U.L. ratings of 2-A, 16-B:C, and 3-A, 20-B:C. Simple recharging returns the units quickly to service. Walter Kidde & Co., Inc.

For details, circle 23 on Post Card

STEEL BELTING conveys heavy, hot materials

Flat-top Hinged Steel Conveyor Belting permits construction of a flat, continuous load supporting conveyor surface for above floor or flush-with-floor

Look for the label that assures weather resistance... high strength...pleasing appearance

This label on a glass-fiber reinforced panel is your assurance of *unmatched weatherability*. It appears only on panels made with PARAPLEX P-444 acrylic-polyester resin. Extensive laboratory and field tests have proved that the proper combination of acrylic and polyester resins produces the *best* weather resistance in reinforced panels. This combination is found only in PARAPLEX P-444, made by Rohm & Haas. The resin also imparts pleasing appearance, high strength, excellent light transmission, and ease of installation. Write for the names of panel manufacturers who use PARAPLEX P-444.

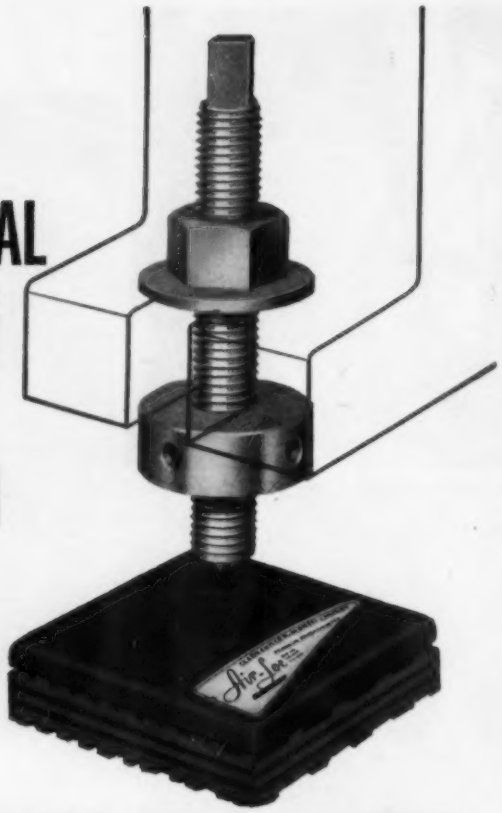
ROHM & HAAS
PHILADELPHIA 5, PA.

PARAPLEX *is a trademark, Reg. U.S. Pat. Off. and in principal foreign countries.*

PARAPLEX P-444

Circle 597 on postcard, page 33

THE ECONOMICAL APPROACH TO VIBRATION CONTROL



JACMOUNT

MACHINE MOUNTS

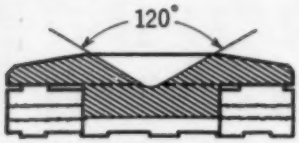
Jacmounts are designed for economy in machine mounts. While low in cost, they rate high in their ability to isolate shock and noise, and to dampen 85% or more of machine vibration.

Jacmounts are made in two units: a cast steel base plate — bonded to a heavy pad of shock absorbent Air-Loc®; and a jack screw assembly for accurate leveling. The base plate is recessed with a 1¼" diameter cone-shaped depression to accommodate the screw.

Jacmounts are easily installed, requiring no bolting or cementing.

BUY ONLY WHAT YOU NEED FOR YOUR MACHINES

Many machines already have jack screws furnished as original equipment. In this case, you buy only the base plate. Its conical recess has an included angle of 120° to take a wide range of screw diameters. If your machines are without jack screws, you buy the complete unit.



Conical recess will accommodate a wide range of screw diameters.

In either case, you'll get a mount of excellent stability and performance.

Jacmounts are adaptable to your mounting requirements. Call your local Air-Loc distributor now, or write for complete information.

Air-Loc® DIVISION

Clark, Cutler, McDermott Co.

115 WEST CENTRAL ST. • FRANKLIN, MASS.

Circle 598 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

installations. Consisting of end-curved, interlocking and overlapping steel belt links, belting can negotiate convex or concave curves with safety. It is available as one-way belting or as two-way belting for reversible conveyor systems that will transport in either direction. Design forms a "moving sidewalk" that can handle bulky, hot or heavy materials and assemblies that are wider than the conveyor. It permits cross flow traffic even while in motion. May-Fran Mfg. Co.

For details, circle 24 on Post Card

FLOW INDICATOR features adjustable alarm switch

Fig. 1885-CDA Flo-Eye Indicator Alarm incorporates an adjustable alarm integrally mounted in a weath-

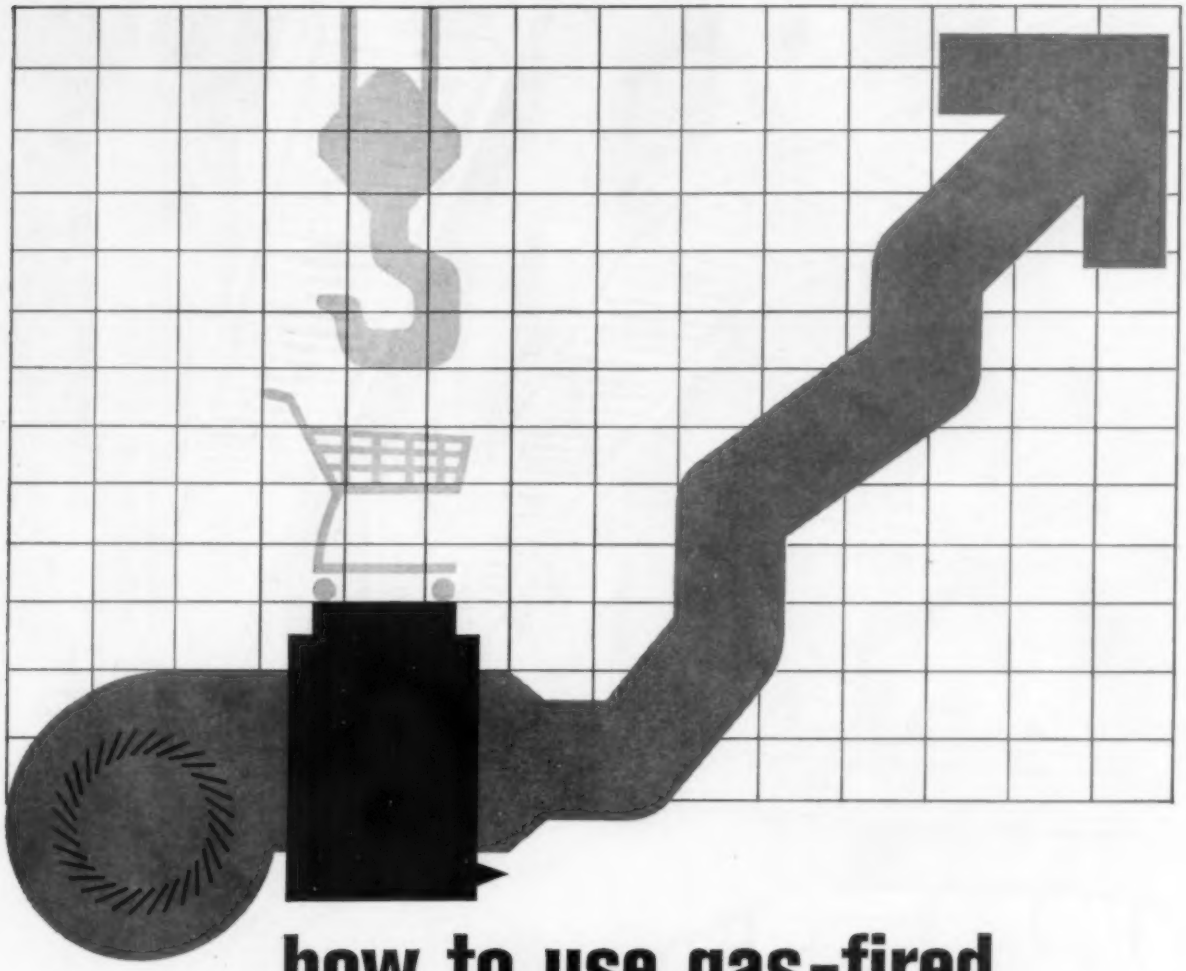
erproof housing. A plug rises and falls with changes in flow rate and thus operates a reed-type alarm switch adjustable in the over-all flow range of 0.05 to 10 gpm. Indicator is brass, for ½-in. pipe connections. Schutte and Koerting Co.

For details, circle 25 on Post Card

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 33-34.

CORROSION INHIBITOR is low priced, nonstaining

Available as a free-flowing powder (Formula 1195) and in briquet form (Formula 1495) this nonstaining corrosion inhibitor is for use in open cooling water systems. It is colorless and nontoxic in working concentrations, according to manufacturer, and may be dumped into regular sanitary sewers



how to use gas-fired duct furnaces most profitably

Free from Reznor: the third in a series of new Reznor Heating Handbooks, "Commercial and Industrial Applications of Duct Furnaces." Duct furnaces offer a relatively new way of heating through air distributing systems. They provide all the economies of direct fired heaters, yet may be located at a distance from the space to be heated. Installation is easy — just connect gas pipe, power, and a vent.

To use duct furnaces most advantageously requires some knowledge of special considerations involved in specific commercial and industrial applications.

That's the purpose of this new handbook, published by Reznor, the world's largest manufacturer of gas unit heaters. It tells about the various ways Reznor duct furnaces can be used for heating or in combination with cooling systems. Also included are illustrations, load calculating data, and practical suggestions to help you get better heating at lower cost.

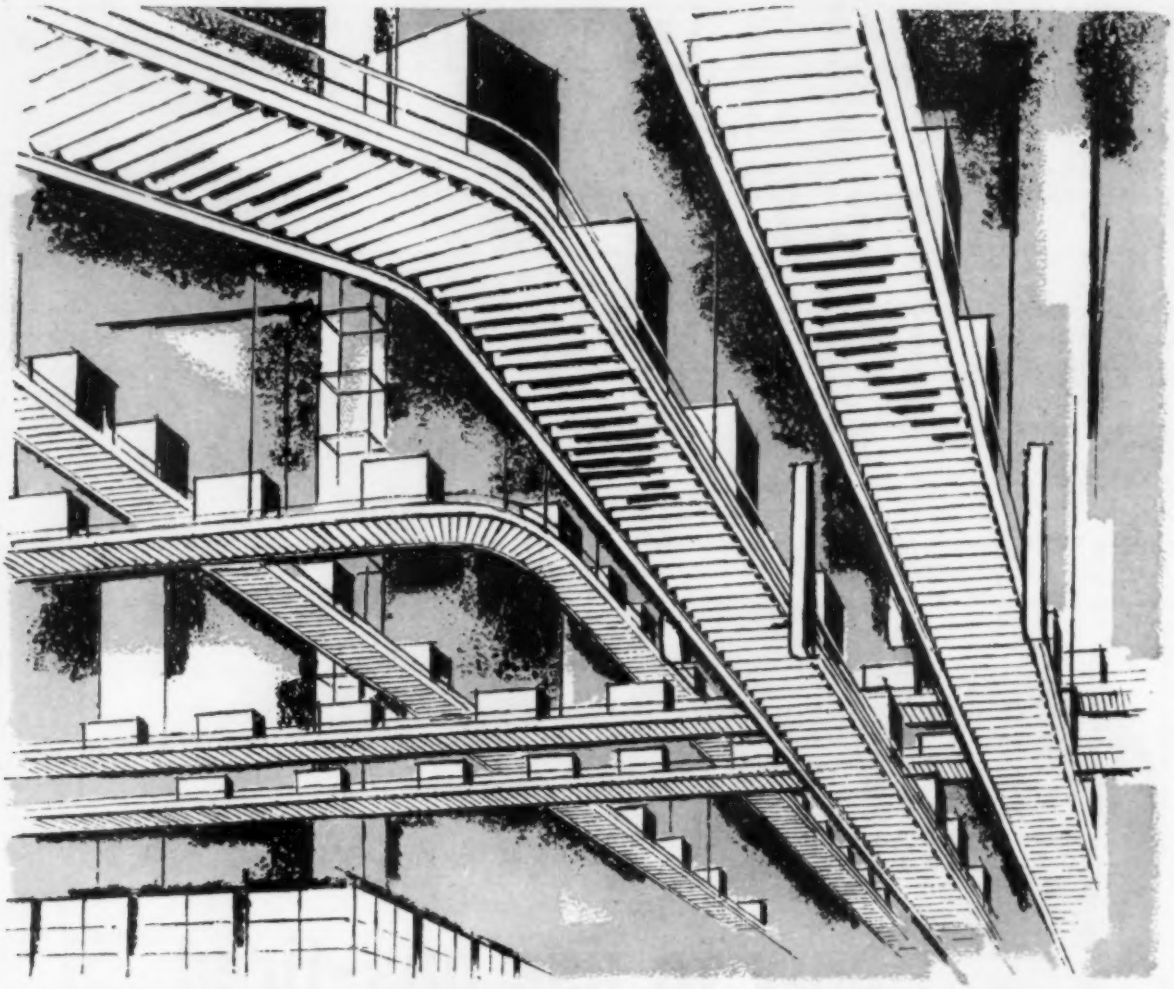
For your copy, mail the coupon to Reznor. And for more information on Reznor heaters, call your distributor or nearby district office listed in the Yellow Pages under "Heaters-Unit".

REZNOR HEATERS

REZNOR MANUFACTURING COMPANY
Dept. PE-11, Mercer, Pa.
Send me a copy of "Commercial and Industrial Applications of Duct Furnaces".

name _____ title _____
company _____
address _____
city _____ state _____

Circle 599 on postcard, page 33



DO YOU THINK YOU NEED A BIGGER PLANT?

Does your plant seem crowded? You could build a bigger one—but do you really need to?

The solution to problems like these is Alvey Conveyor's business.

Maybe your time-lags, back-up on production lines, and crowded storage areas are the result of poor coordination between the separate elements of your system—or out-of-date handling methods.

Let a team of Alvey engineers look at your layout. They can show you how to keep your material moving and your space available.

Whether you need a complete system or single material handling device . . . call or write Alvey for free consultation.

Vertical Lift Conveyors | Pallet Loaders | De-Palletizers | Air-Chain Conveyors | Telescopic Boom Conveyors | Vertical Indexing Conveyors

ALVEY CONVEYOR MANUFACTURING COMPANY

9377 OLIVE STREET ROAD, ST. LOUIS 32, MO. *Branch Offices in Principal Cities*

Circle 600 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

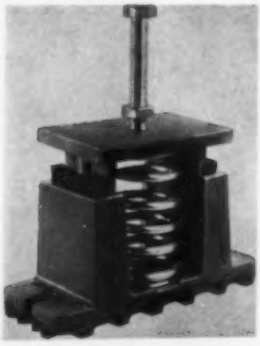
(Begins on page 172)

without damage to the system. Also accidental spillage presents no problems. Cost is about one-third that of chromate treatment. According to manufacturer the product is capable of inhibiting corrosion at less than 1 MPY at above 140 F in mixed metal systems. Only ½ lb need be added to each 1000 gal of water. Ionac Chemical Co.

For details, circle 26 on Post Card

SPRING MOUNTING stops noise, vibration, shock

Type LNAA Mounting, an isolator utilizing a single helical coil steel spring as the cushioning medium is claimed to reduce equipment installation time 50 per cent, maintain machinery efficiency, and stop vibration, shock, and structural noise transmis-



sion from fans, cooling towers, motor generators, etc. A selection of four springs, for insertion into the isolator housing, provides a load-carrying capacity range from 50 to 540 lb. Its cast semi-steel housing is compactly built, and has an access port on each side for interior servicing without dismantling. An external leveling device eliminates need for shims, and rubber snubbing chocks restrict lateral movement. The Korfund Co., Inc.

For details, circle 27 on Post Card

ROOF COATING with glass fiber has increased strength

Ply-O-Glas, a coating to be sprayed on roofs of unusual geometrical form, is composed of Neoprene, Hypalon, and chopped glass fiber roving. The glass fibers increase structural strength and bulk of the coating without adding materially to the cost. A base coat of Neoprene is applied by spray gun, roller or brush, then a coating of the chopped glass and Neoprene is sprayed on. The finish is usually Hypalon,

A Westinghouse V-2 Disconnecting Switch advantage to you:
Teflon-coated bushings on live-side loaded bearings are almost frictionless, resist corrosion, never need lubrication, assure long life and less maintenance

For complete facts on V-2 disconnecting switches, contact your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.
You can be sure . . . if it's **Westinghouse**
J-61016

Circle 601 on postcard, page 33

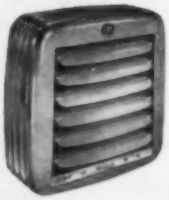
investing in heating?
here's the hottest "stock" on the market...

MODINE UNIT HEATING EQUIPMENT

GAS-FIRED PROPELLER UNITS – Sturdy, attractively styled and exceptionally lightweight . . . up to 50% lighter than other makes of comparable capacities. Direct-fired heat exchangers and clogproof stainless-steel burners hold fuel costs low while assuring just-right comfort. Eight sizes – 25,000 to 310,000 Btu.

GAS-FIRED BLOWER UNITS – Ideal for heating, ventilating, filtering, cooling. May be installed fully exposed in area to be served or remotely located with duct work. Seven models – 50,000 to 310,000 Btu.

LIGHTWEIGHT
COMPACT
EASY TO MAINTAIN
EASY TO INSTALL
DURABLE
FUEL-THRIFTY



STEAM AND HOT WATER UNITS – Three distinct designs: HORIZONTALS can be direct-from-pipe suspended . . . without other supports . . . 24 sizes; VERTICALS are available in 28 sizes. Choice of four air deflectors. Depending upon size selected, mounting height may vary from 10 to 60 feet; POWER-THROWS are specially designed for hard-to-heat locations. High-velocity discharge assures exceptionally long heat-throw . . . up to 140 feet. Available in 10 sizes.

STEAM SPECIALTIES – A complete line: drip, thermostatic and process steam traps; radiator supply and double service valves; strainers; expansion joints; lift fittings.

APPLICATION COUNSEL on any of the Modine products shown above may be obtained from your qualified heating contractor. And to fill your requirements, he can draw from the full stocks carried by leading Modine wholesalers in every major industrial area. For product catalogs, write to Modine Manufacturing Company, **1563** DeKoven Ave., Racine, Wisconsin.

Modine
MANUFACTURING COMPANY

IN CANADA: SARCO CANADA, LTD., TORONTO, ONT.

U-1445

Circle 602 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

available in a wide range of colors. The coating can be applied in any thickness, those of 1/16 and 1/8 in. are standard. Various textures can also be obtained. Cost is about $.50 to $1.00 per square foot depending on area to be coated. Ply-O-Glas Co. of America.

For details, circle 28 on Post Card

CALCULATOR gives metric, English factors

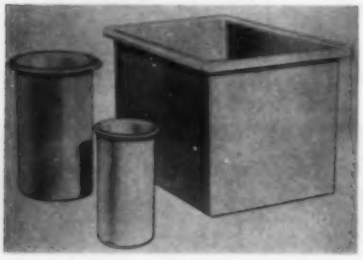
Instant conversion calculations are provided with this calculator giving decimal equivalents from 0.01 mm to 100 mm, Centrigrade-Fahrenheit factors

from -459.4 F to 3000 C. Also gives decimal and metric equivalents of parts of an inch and a large number of simple formula conversions. Enclosed in plastic case, calculator costs less than $2 when ordered in quantities of five or more. Kelm Mfg. Co.

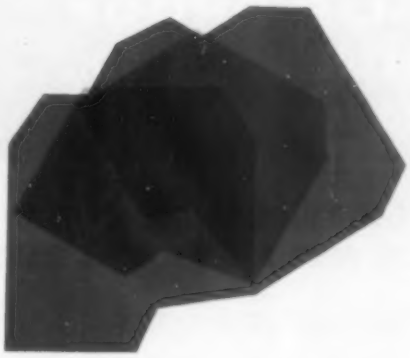
For details, circle 29 on Post Card

STORAGE TANK for low cost, safe material handling

This colorless, translucent polyethylene tank handles and stores materials from food to corrosives, solid or liquid,; it prevents contamination and is unbreakable, lightweight and easy to clean. Seamless-molded for strength and rigidity, it is said to outlast metal and cost less than stainless steel. It



A Westinghouse Metal-Clad Switchgear advantage to you:
Hinged arc chute simplifies inspection and maintenance of DH breaker



For complete facts on Westinghouse metal-clad switchgear using DH magnetic air circuit breakers, contact your Westinghouse representative or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.
You can be sure . . . if it's **Westinghouse**
J-61017

Circle 603 on postcard, page 33

GET GREATER SAFETY PROTECTION

in your plant

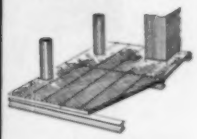
WITH GLOBE *Safety*

GRIP-STRUT

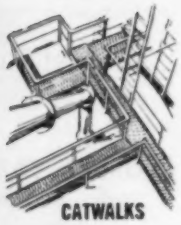
the open steel floor grating that is

- **FIRE PROOF**
- **SLIP PROOF**
- MAXIMUM STRENGTH
- MINIMUM WEIGHT

WORK PLATFORMS



FLOORING



CATWALKS

BALCONIES

NOW··· Galvanized Standard Finish at NO EXTRA COST!

IMPORTANT FEATURES

- ★ All one piece, not welded, riveted or expanded.
- ★ Open space in excess of 55% of area for easy access of light and air.
- ★ No extra supports needed—channels are integral part of the material.
- ★ Self cleaning.
- ★ Cut and installed like lumber by your own maintenance force.
- ★ Low in original cost.
- ★ For balconies, no extra sprinkler heads needed. Easy to stand on.
- ★ Cool in summer, warm in winter.

Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads. Write for new catalog.

Distributors in all principal cities. Consult yellow pages in phone book under "GRATING".

124

GRIP-STRUT PRODUCTS DIVISION | THE GLOBE COMPANY

4016 SOUTH PRINCETON AVENUE • CHICAGO 9, ILLINOIS

Circle 604 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

is odorless, non-toxic and chemically inert to corrosives such as hydrofluoric and hydrochloric acids, sodium hydroxide and alkaline solutions. It stands temperatures to 180 F. Available in rectangular shape to 60 gal., cylindrical shapes to 350 gal, containers can be fitted with valve, drain, inlet, outlet, and overflow connections at extra cost; covers are optional. Apex Reinforced Fibre-Glass Div., White Sewing Machine Corp.

For details, circle 30 on Post Card

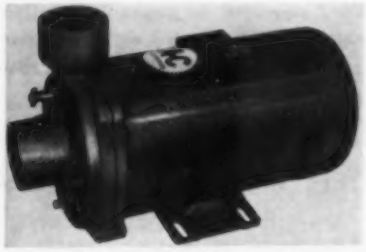
GAS-FIRED UNIT HEATERS have centrifugal blowers

Selection of centrifugal blowers for Series NB Heaters is said to result in unusually low operating noise level. They are suggested for installations where the need for extreme quiet operation rules out conventional propeller fan type units. Compact and lightweight, the gas-fired heaters offer flexibility of placement. Because of an ability to overcome duct resistance, they are suited for remote location with a run of duct to the heated space. Eight basic sizes provide capacities from 50,000 to 250,000 Btu per hour input. Industrial Div., American-Standard.

For details, circle 31 on Post Card

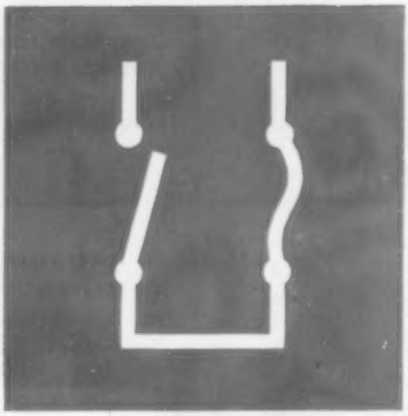
CLOSE-COUPLED UNIT for low-cost pumping

Model C-15-Type RHK Pump, for handling clear non-corrosive liquids at temperatures to 180 F, is available in range through 48 gpm with heads to 100 ft. The cast-iron, single-stage, single-suction, fractional horsepower



pump has enclosed Delrin impellers and screwed connections. Compact construction and lower weight are achieved by mounting pump parts on motor and using motor end housing as pump stuffing box cover. Units can be installed horizontally or vertically by bolting motor feet to a suitable

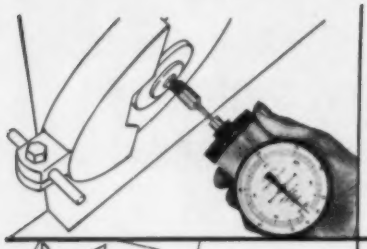
A Westinghouse Switchgear advantage to you:
DFS drawout switch and fuse switchgear is design-proved in Westinghouse high power laboratory to assure maximum service reliability



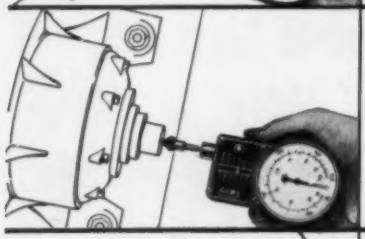
For complete facts on DFS drawout switch and fuse switchgear, contact your Westinghouse representative or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.
You can be sure . . . if it's **Westinghouse**
J-61018

Circle 605 on postcard, page 33

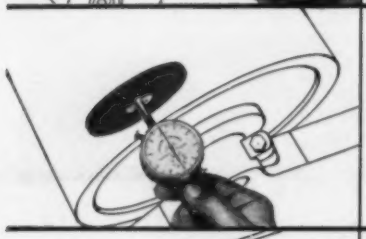
Check Speeds with a
BIDDLE Tachometer
and be sure!



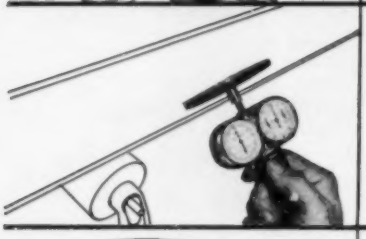
a **JAGABI® Centrifugal TACHOMETER** reads instantaneous speeds or variations in speeds up to 48,000 RPM. Single or multiple ranges.



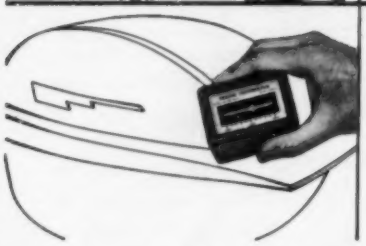
DR. HORN TACHOMETER is a centrifugal type instrument with 6 ranges for checking speeds from 25 to 30,000 RPM.



JAGABI® Chronometric SPEED INDICATOR measures *average* speeds. Available in ranges from 100 to 100,000 RPM.



the **JAGABI® TACHOSCOPE**—a stop watch and revolution counter in one—gives average FPM and RPM up to 20,000.



FRAHM® Resonant Reed TACHOMETER checks speeds *at a touch*. Requires no contact with moving parts—reads directly in RPM.

There's a Biddle Hand Tachometer precision-engineered for every speed measuring need . . . each complete with *all* accessories and carrying case, as required . . . and all backed by Biddle Reliable Repair Service. To help you select the Biddle instrument best for you, write for BULLETIN 35PL.

B106

BIDDLE INSTRUMENTS

JAMES G. BIDDLE CO.

Electrical & Speed Measuring Instruments

1316 ARCH STREET • PHILADELPHIA 7, PA.

Circle 606 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

support. Casings have centerline discharge, are self-venting and can be rotated to any of four positions 90 deg apart. Motors are standard NEMA, rated ⅓ through 1 hp, in single and three-phase construction at 3450 rpm. Allis-Chalmers Mfg. Co.

For details, circle 32 on Post Card

RADIATION METER, pocket-sized, for personal protection

A flick of a switch gives instant readings of radiation concentrations when using low-cost Pocket Radiation Meter. It is designed to perform the

same functions as Geiger counters. It weighs less than 8½ oz, uses penlight batteries or mercury cells, and operates at temperatures from -20 to 140 F. A standard model (0.1 to 50 R/hr, or 0.01 to 1 R/hr) and a high-range model (1 to 500 R/hr, or 0.2 to 50 R/hr) are available. Gelman Instrument Co.

For details, circle 33 on Post Card

It's easy to obtain product data with the postage-free Reader Service Card provided on pages 33-34. Use them for information on advertised products, too. Just circle the key number at bottom of the ad.

TEFC MOTORS for use where dirt is prevalent

Totally-enclosed, fan-cooled motors are additions to this company's Form G fractional horsepower units. Their dust-tight design prevents entry of foreign particles, and cooling is accomplished by an outboard fan directing an air stream over the motor. Motors with resilient base for quieter operation and with NEMA 56C end

Circle 607 on postcard, page 33 →

the only PUSHBUTTONS with WIPING CONTACTS

STANDARD PUSHBUTTON

SELECTOR SWITCH

PUSH-TO-TEST LIGHT OR LIGHTED PUSHBUTTON

PILOT LIGHT

Touch a finger to any Clark pushbutton, and there's positive response *every* time.

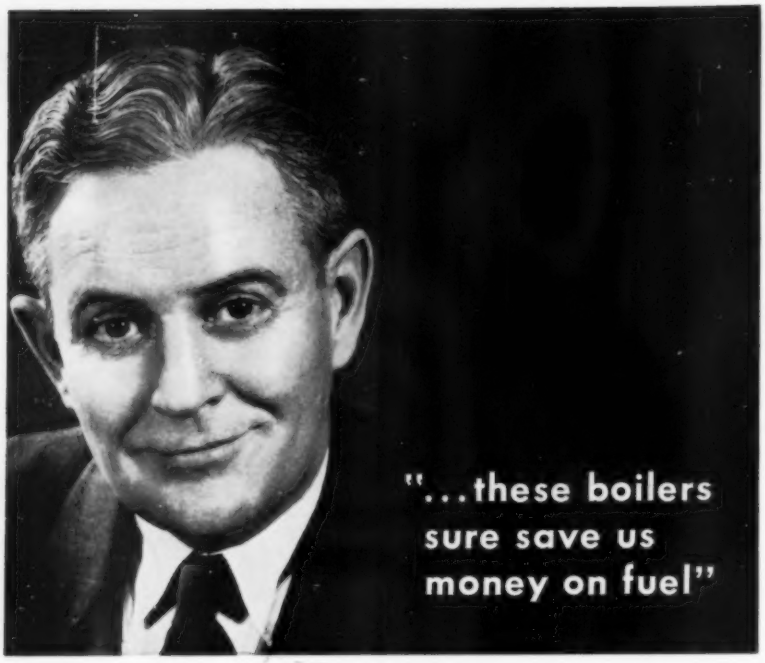
Why are Clark control units more dependable than others? Because, with each operation, the fine silver contacts are cleaned. The rolling, wiping action between the movable and stationary contacts as they make or break the circuit, wipes off any dust or non-conducting film that may be present. It's a Clark exclusive.

But this is only one of many features that make Clark pushbutton units the most reliable and versatile on the market. Ask your Clark distributor or sales representative to show you how the sturdy construction, ease of wiring and maintenance, and flexibility will help solve *your* pushbutton problems. 61P82

COLORS? YOU NAME IT, WE'VE GOT IT! You can select from seven different colors for your pushbutton operators, lenses and ferrules. Groups of related control units can be coded by ferrule color, specific functions by operator color—another Clark original to help simplify otherwise complicated control stations. With Clark's complete line of control units, utilizing interchangeable operators, ferrules and nameplates, you have a virtually unlimited number of combinations of electrical functions and colors from which to choose.

THE CLARK CONTROLLER COMPANY

MAIN PLANT: CLEVELAND, 10 • **WESTERN PLANT:** LOS ANGELES, 58
IN CANADA: CANADIAN CONTROLLERS, LIMITED, TORONTO, ONTARIO

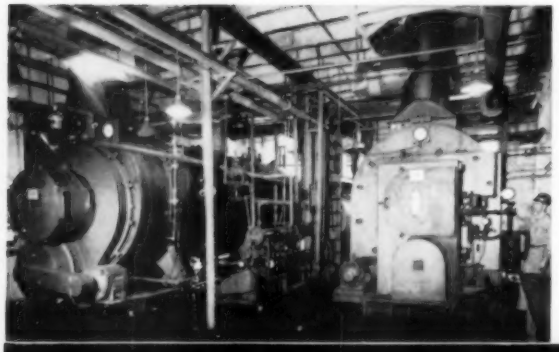


Continental

2-PASS

AUTOMATIC BOILERS

Here's why you can be sure of *lower* fuel costs with Continental boilers: Their flue gas temperature is *guaranteed* not to exceed 125°F above the boiler water or steam temperature. High fuel-saving efficiency over the entire life of these boilers is assured by the unequalled heat transfer advantages Continental's exclusive "spinning gas" combustion principle. This spiraling action provides 5 times longer gas travel which assures maximum heat transfer and resultant low stack temperature. With their *guaranteed* 80% minimum efficiency, Continental boilers have an impressive service-proved record for outstanding fuel economy. By keeping fuel costs down, these money-saving boilers enable you to write off their initial cost *faster*. Keep this Continental cost-saving advantage in mind when specifying or buying steam or hot-water boilers for heating or process requirements. Contact your nearby Continental representative or write for latest bulletin of Continental cost-saving features.



These two oil-fired Continental boilers are saving a large meat processing company over $7000 yearly on fuel and maintenance costs.

CONTINENTAL BOILER Division
BOILER ENGINEERING & SUPPLY CO., Inc.
Phoenixville, Pennsylvania
Nationwide Sales and Service in Principal Cities

Circle 608 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

mounting are included in the line. Most models feature a welded-on base for accurate shaft alignment. Available in ⅛- to 1-hp ratings in NEMA-56 frame size, these motors are reported to meet NEMA standards in capacitor-start and polyphase single-speed and split-phase single- and two-speed designs. General Electric Co.

For details, circle 34 on Post Card

SELF-RELEASING HOOK for metal-mesh slings

This choker hook for use with Gripper Metal-Mesh Slings allows automatic unhitching of the sling when unloading bundles of materials—no need for a rigger to unhitch the sling. Device consists of sliding choker which engages and holds female handle of the sling. With load in sling, tension

holds choker hook in upright position. When load is lowered, weighted arm of choker hook falls, disengaging female sling handle. Sling is then easily pulled from under load. Cambridge Wire Cloth Co.

For details, circle 35 on Post Card

HEAVY-DUTY CLEANER removes grease and grime

Navee '42 is a powerful marine and industrial degreaser for removing stubborn grease and grime quickly and economically from industrial machinery and dockside areas. Made of solvents, emulsifiers, wetting agents, the cleaner has degreasing properties and chemical action to attack and penetrate grease and oil, after which the residue can be rinsed away with water, steam or solvents. It is said to remove such unrelated compounds as bunker C oil, carbon stains, diesel oils, preservative coatings, lead oxides.

According to manufacturer, Navee '42 emits no hazardous fumes, has a

TO SAVE SPACE IN YOUR PLANT

NEW HIGH SPEED COMPRESSOR CAN BE ARRANGED VERTICALLY OR HORIZONTALLY

(using the same parts)

Single-stage, high speed, pressure lubricated compressor offers new versatility. Here are six reasons why you will want to investigate this new model for your plant.

- Improved AERTYTE Disc Valves—You get longer valve life, quieter operation.
- Modern valve-in-head design.
- Gear-type oil pump—Driven by crankshaft, pump delivers filtered, positive full force feed lubrication to all frame running parts. Safety switch automatically shuts down compressor in event of low oil pressure.
- Horizontal or vertical arrangement using the same parts.
- Durable construction—forged steel connecting rod and crank shaft; metallic packing and scraper rings; precision fitted crosshead with full floating crosshead pin—all results in minimum maintenance.
- Available now—from 20 to 100 hp; displacement from 108 to 1590 cfm.

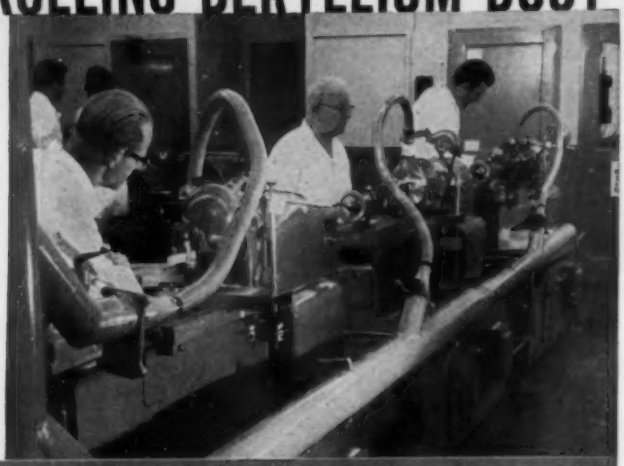
But this is just part of the story about Pennsylvania's new Model 3F compressor. Learn all the facts in our new Bulletin No. 360. Write to Dept. C-11 for your copy, today.

PENNSYLVANIA PUMP AND COMPRESSOR COMPANY

Circle 609 on postcard, page 33

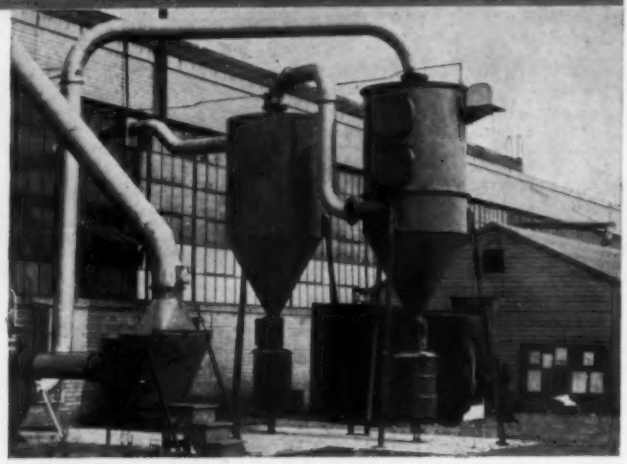
Easton, Pa. • Earning Customer Confidence Since 1920

CONTROLLING BERYLLIUM DUST



. . . Another Tough Task Made Easier and Safer by

SPENCER VACUUM

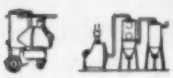


The Bendix Corporation, Eclipse-Pioneer Division

Toxic nature of its dust makes beryllium a "problem" metal to machine. But not here!
Spencer vacuum, piped into a specially designed "clean room", picks up the dust right at the machines . . . whisks it away to filter-equipped separators outside the building.
Result: machining is quicker, safer, easier.

Request Catalog No. 155B, "Spencer Vacuum", or write for recommendations on your particular problem.

Also manufacturers of portable vacuum cleaners and pneumatic conveying systems.



The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

Circle 610 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

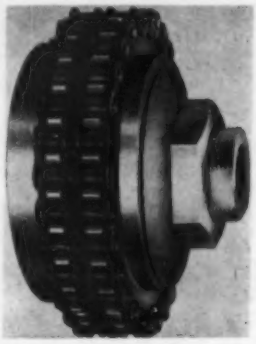
(Begins on page 172)

high flash point, is not volatile and is free from fire risk under most conditions. Its cleaning action is claimed superior to caustics or highly alkaline cleaners. Allied Chemical Corp.

For details, circle 36 on Post Card

SAFETY DEVICES provide overload protection

OSDC (Overload Safety Device Coupling) protects through use of a basic OSD unit combined with a roller chain coupling half counterbored to fit the



flange. Standard double width roller chain couples the basic unit and coupling half. The torque-limiting devices automatically disengage when a set maximum load is reached, and are reengaged when overload is eliminated. They are adjustable with torque wrench. Dalton Gear Co.

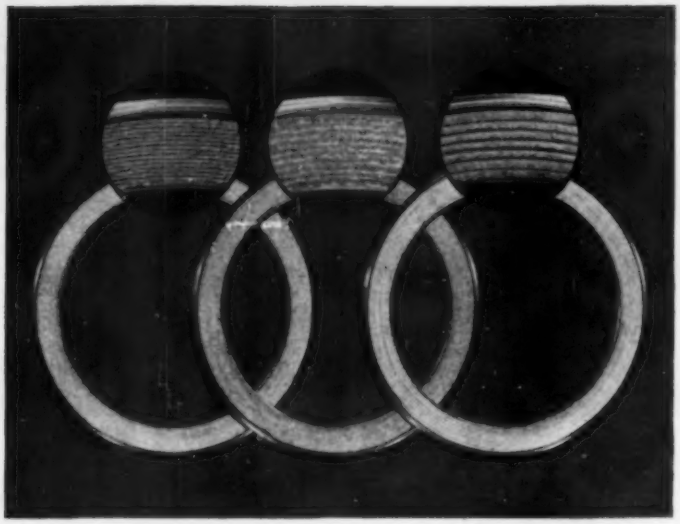
For details, circle 37 on Post Card

ASBESTOS GLOVES for handling very hot objects

Three to five times longer wear in handling parts with temperatures as high as 1700 F is claimed for these

gloves of double-thick (⅛ in.) Dura-Weave fabric averaging 5½ lb per sq yd with 95 to 99 per cent asbestos fiber. Thumb, palm, fingers and back are of

ENGINEERED GASKETS
for Plant Maintenance



Exacting control of gasket density is obtained by varying the number of metal plies and filler material to seal a specific pressure.

Controlled density is the reason why Garlock *Guardian Gaskets offer you unusual sealing ability.** A series of V-shaped metal plies alternated with layers of filler form the "body" of GUARDIAN spiral-wound gaskets. The proper selected thickness of filler material and preformed metal, the number of laminations of filler and metal and the correct tension of filler and metal while being formed into a gasket are factors engineered to achieve the proper gasket density.

This controlled density—combined with the special V-shaped metal plies—allows the gasket to "breathe." Thus, a tight seal is effected at all times despite equipment or line expansion and contraction. In no other type of gasket is it possible to vary the compressibility to meet different pressure and bolt load requirements.

Complete range of sizes, and shapes and wide temperature range is another reason for specifying Garlock GUARDIAN Gaskets . . . 1/16" thickness up to 6", 1/8" up to 30", .175" up to 60" and 1/4" thick up to 60" depending on flange width. For temperatures up to +1900°F. with ceramic filler material.

Type CR GUARDIAN Gaskets are furnished with a cadmium plated centering ring for corrosion resistance and prolonged shelf life. Centering ring also is marked with the pressure series —assuring application of correct gasket density for specific pressure.

Convenient local stocks of most standard sizes are maintained at Camden, New Jersey, Cleveland, Ohio, Houston, Texas and San Francisco, California, for quick delivery.

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Find out more from your Garlock representative at the nearest of the 26 Garlock sales offices throughout the U. S. and Canada, or write for catalog AD-176, Garlock Inc., Palmyra, N. Y.
Canadian Div.: Garlock of Canada Ltd.
Plastics Div.: United States Gasket Co.

Order from the Garlock 2,000... two thousand different styles of Packings, Gaskets, Seals, Molded and Extruded Rubber, Plastic Products.

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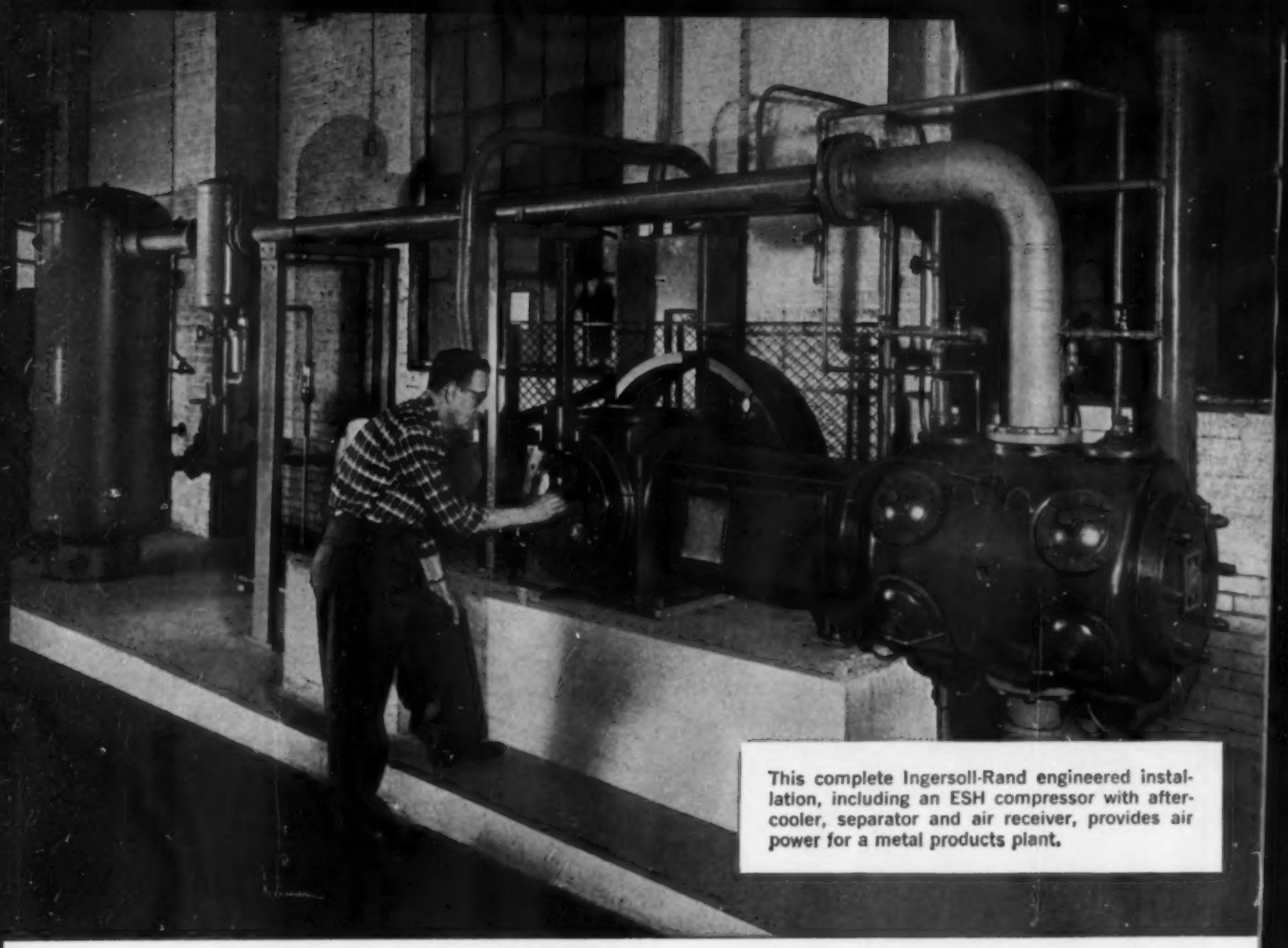
Circle 611 on postcard, page 33



This complete Ingersoll-Rand engineered installation, including an ESH compressor with aftercooler, separator and air receiver, provides air power for a metal products plant.

Here's why

TIME TELLS THE DIFFERENCE

in Ingersoll-Rand compressors

"No bearing wear in 60,000 hours"..."43,680 hours with no valve maintenance required"..."63,648 hours with no forced maintenance"..."13 years without even *cleaning* the valves". That's what our customers have been telling us, and there are many more true case histories like them which prove the *long-range economy* of Ingersoll-Rand compressors.

The *extra value* that's built into every type of Ingersoll-Rand compressor pays off with reduced maintenance and attention over many years of operation, and the result is big savings in the cost of your air power. Ingersoll-Rand offers also the *most complete* line of compressors, in reciprocating, centrifugal, axial-flow, rotary and thermal types. There are units from ½ to 25,000 hp, for pressures from one micron to 125,000 psi. Call your I-R man today for help on your job.

ESH	PHE	XLE	PRE	HHE	XPV
20 to 150 hp	75 and 100 hp	125 to 350 hp	400 to 2000 hp	200 to 4000 hp	(steam-driven) 200 to 1500 hp

Circle 612 on postcard, page 33

Only Ingersoll-Rand air compressors give you all these EXTRA VALUE features...

AIR-CUSHIONED CHANNEL VALVES
Known for high efficiency, quiet operation and exceptional durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and bowed leaf springs, with trapped-air spaces which cushion action, prevent impact. Separate stainless-steel seat plate may be turned over or replaced for new life.

FULL-FLOATING ALUMINUM BEARINGS
Never need fitting or adjustment. They "roll with the punch" of each stroke, to distribute the load evenly over inside and outside surfaces.

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Filtered oil under pressure to all bearing surfaces cuts wear to minimum.

SEALED FRAME
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and the World's Most Comprehensive Compressor Experience

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PLANT ENGINEERING EQUIPMENT

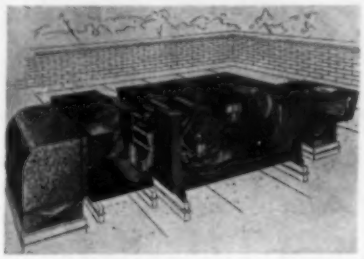
(Begins on page 172)

the heavy asbestos for full protection. Available in five-finger glove, one-finger mitt, regular mitt, reversible mitt and oval or square pad style. Asbestos Cloth Products Co.

For details, circle 38 on Post Card

ROOF-TOP UNITS for heating, cooling, ventilating

Choice of gas-fired, oil-fired or combination models is offered in these roof top units, as well as flexibility in matching unit to the application—heating only, with or without filters; heating and ventilating, with or without filters and with manual or automatic dampers; and heating-cooling-ventilating with manual or automatic dampers. Heating output range is 280,000 Btuh to 1,000,000 Btuh with air volume of 3000 to 15,000 cfm. Additive direct expansion evaporator units provide 10 to 45 tons of cooling. Lennox Industries, Inc.



For details, circle 39 on Post Card

PIPE WRENCH for heavy duty is light, adjustable

Gripso-Matic, a lightweight, high-strength pipe wrench, provides instant adjustment to any pipe size and can be closed when not in use. A spring-loaded ratchet locking device is in the handle, and a hook calibrated from ½ to 2 in. enables the user to set it in advance. Available in 4 sizes to 14 in. Standard Fittings Co.

For details, circle 40 on Post Card

THERMOSTATIC TRAP with rugged bi-metal control

Equipped with a stainless steel bi-metal thermostatic air vent, Type 150 DE Float thermostatic steam trap provides continuous discharge of condensate and air, shuts tightly on steam to prevent waste. Its rocker design simplifies mechanical linkage, allows greater compactness. In-line inspection is accomplished by removing body housing. Connections are for ¾-in. pipe. Three pressure ranges are available: from 0 to 30, 75 and 150 psi. Catalog FE-310 gives information. Farris Engineering Corp.

For details, circle 41 on Post Card

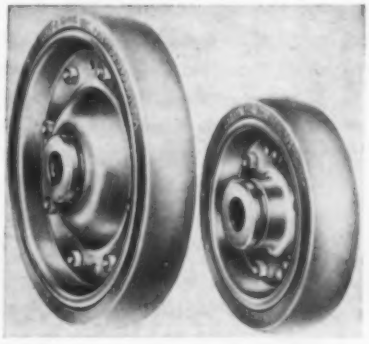
BALL VALVES have variety of interchangeable seats

Petro Floating-Ball Valves with nylon, Neoprene, Teflon and Buna-N seats are designed to meet a broad range of media requirements in petroleum, chemical, food processing and other piping systems. Nylon seat is rated 2500 psi for ¼ to ¾ in., 2000 psi for 1 to 2 in. valves. Teflon seat rating is 1000 psi. Effective operational range is -20 to 180 F for nylon, -450 to 450 F for Teflon, -20 to 200 F for Neoprene and -20 to 250 F for Buna-N. Valves come in several metals, in sizes ¼ to 2 in. Clayton Mark & Co.

For details, circle 42 on Post Card

STEEL DISC WHEELS have polyurethane tires

Series 124 Wheels feature 6- or 8-in. replaceable polyurethane tires for use on bulky wheeled equipment requiring easy rolling with resistance to corrosive elements. Due to low coefficient of friction and high resiliency, polyurethane tires roll easily and will not mark or stain floors even under heavy loads.

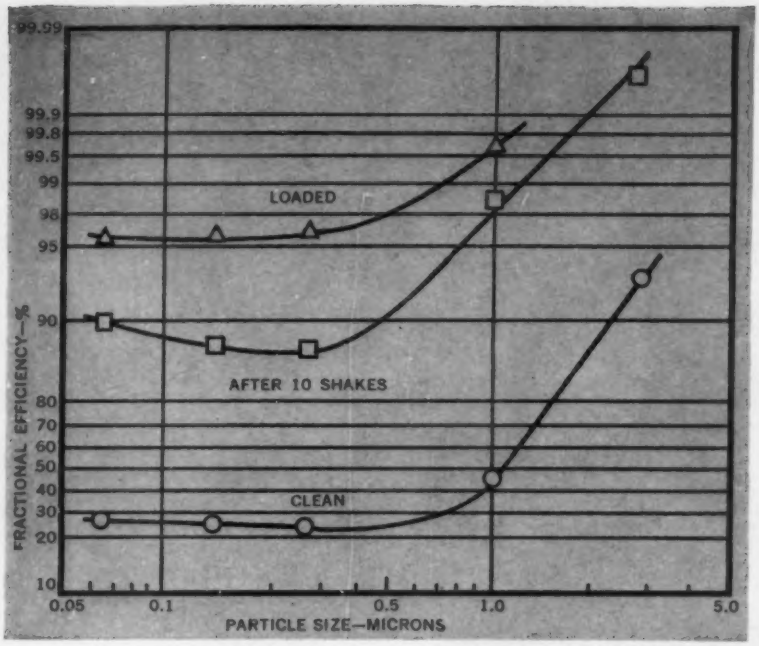


They are described as resistant to oils, mild acids, alkalis, greases, fatty substances and most detergents. Load capacities are 500 lb for the 6-in. wheel, 700 lb for the 8-in. wheel. Clincher type side plates are easily loosened for changing tires. Jarvis & Jarvis Div., United Service Equipment Co., Inc.

For details, circle 43 on Post Card

EPOXY RESIN for explosion-proof fittings

Scotchcast Electrical Resin XR-5046, a semi-flexible, self-curing at room temperature epoxy resin for sealing grounded well junction boxes, is a two-

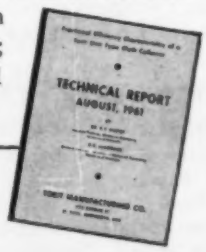


revolutionary "dust-making machine" proves Torit Dust Collectors have

HIGH AIR FILTERING EFFICIENCY

Because of an increase in critical dust collection problems and rising standards in industrial hygiene, need has arisen for more precise measurements of filtering efficiency. In the past, because of inability to produce uniform-size, sub-micron dust particles, filtering efficiency has been measured by weight. However, recently a homogeneous aerosol generator capable of producing uniform sub-micron particles as fine as .05 microns (1/500,000 inch) and as coarse as 15.0 microns, has been developed by Dr. K. T. Whitby, leading authority on particle technology. (Smoke, fumes, and bacteria fall within this range; most industrial dusts are 2 microns or larger.) Tests using such uniform particles indicate fractional efficiency based on particle count . . . the most exacting filter efficiency tests ever devised.

Under this most demanding of all filter tests, Torit Cloth Filter Dust Collectors performed superbly. Fractional efficiency when loaded with fine dust ranged from 96% at 0.1 micron to 99.99% at 2.5 microns; and after shaking 10 times, from 88% at 0.1 microns to 99.93% at 2.5 microns.



For further information, write for Dr. K. T. Whitby's Technical Report on the "Fractional Efficiency Characteristics of a Torit Unit Type Cloth Collector."

TORIT manufacturing company

1133 Rankin Street, St. Paul 16, Minnesota, Dept. 1836

Circle 613 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

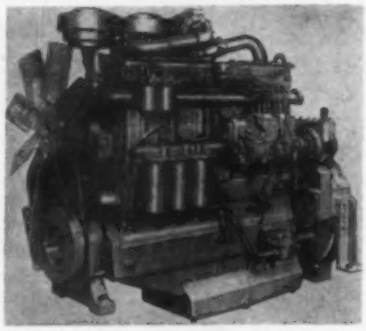
part 100 per cent solids system for field use in potting condulets and other large electrical fixtures. It contains no thinners or solvents, is said to cure evenly and free of voids with less than 1 per cent shrinkage. In large masses it cures from the inside out, preventing stress. Cast in a 30-lb mass with 8-in. diam., 11-in. high, it reaches a peak exotherm of 194 F above ambient. The resin resists impact, shocks, abrasion and cracking. Cast around typical objects and cycled between –70 and 270 F, it remains intact. For exposure beyond those extremes it is suitable for a period of several hours. Minnesota Mining & Mfg. Co.

For details, circle 44 on Post Card

More information on any of these products can be yours without cost or obligation. Use reader Service Cards provided on pages 33--34.

MULTI-PURPOSE ENGINE for the lighter-duty jobs

Model 50-A is a smaller, faster engine for jobs below the range of heavier engines. It is particularly adapted for



electric power generation, primary or standby power, and installations where long periods of uninterrupted running are required. Models operate at 1800 rpm, and units to 100 hp are available in speeds to 2200 rpm. Fairbanks, Morse & Co.

For details, circle 45 on Post Card

FLUORESCENT FIXTURES are rugged, modern in style

The Power-V Series of RLM industrial fluorescent lighting fixtures features ruggedness of construction, trim appearance, ease of installation and

Circle 614 on postcard, page 33 ►

Williams and Company, Inc., Consulting Architects/Schauder and Martin

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MRF goes up at astonishing speed. Expansion is easy and economical. Even the wall systems can be interchanged. In an MRF you can afford to change your mind. Quality for quality, this is economical construction, with the advantages of custom planning.

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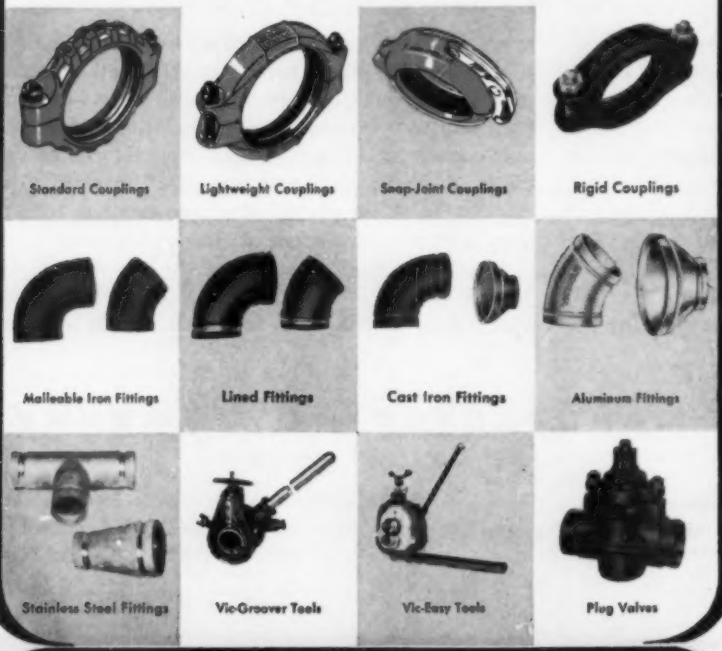

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VICTAULIC COMPANY OF AMERICA
P.O. Box 509, Elizabeth, N.J.

Circle 615 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

maintenance. All models producing both 10 and 25 per cent (nominal) uplighting are designed for high efficiency and good lighting characteristics. Fixtures are adaptable to 430 ma rapid and instant start lamps, 800 ma high output rapid start lamps, and all types of 1500 ma extra-high output rapid start lamps. Sylvania Electric Products Inc.

For details, circle 46 on Post Card

PORTABLE TRANSFORMER for voltage correcting

This voltage-isolation dry-type transformer for portable tools and lights, available for 1 through 5 kva and any ratio through 600 v, weighs only 37 lb.

The single-phase unit has a 4½-per cent regulation at 0.65 lagging power factor and consists of an encapsulated core and coil assembly that is water- and shock-proof. Assembly comes with four skids, an output socket, a 15-ft cord and plug. Westinghouse Electric Corp.

For details, circle 47 on Post Card

FOOD WARMER utilizes fused quartz tubing

Chain or frame-suspended the Infra-Hot requires no structural changes to install and is claimed to provide twice the heat in less time and space than conventional food heating devices. Direct rays, reflected from semi-parabolic aluminum reflectors keep food warm without undue discomfort to food handlers and diners. The infra-red unit also serves to pre-heat dishes before serving. Temperature control dial allows for 13 positions of selective heat. Of stainless steel, the fixture is announced as UL-approved, shock resistant. It comes in 120 v, 500 to 1450 w; 220 v, 750 to 1450 w. Dimensions

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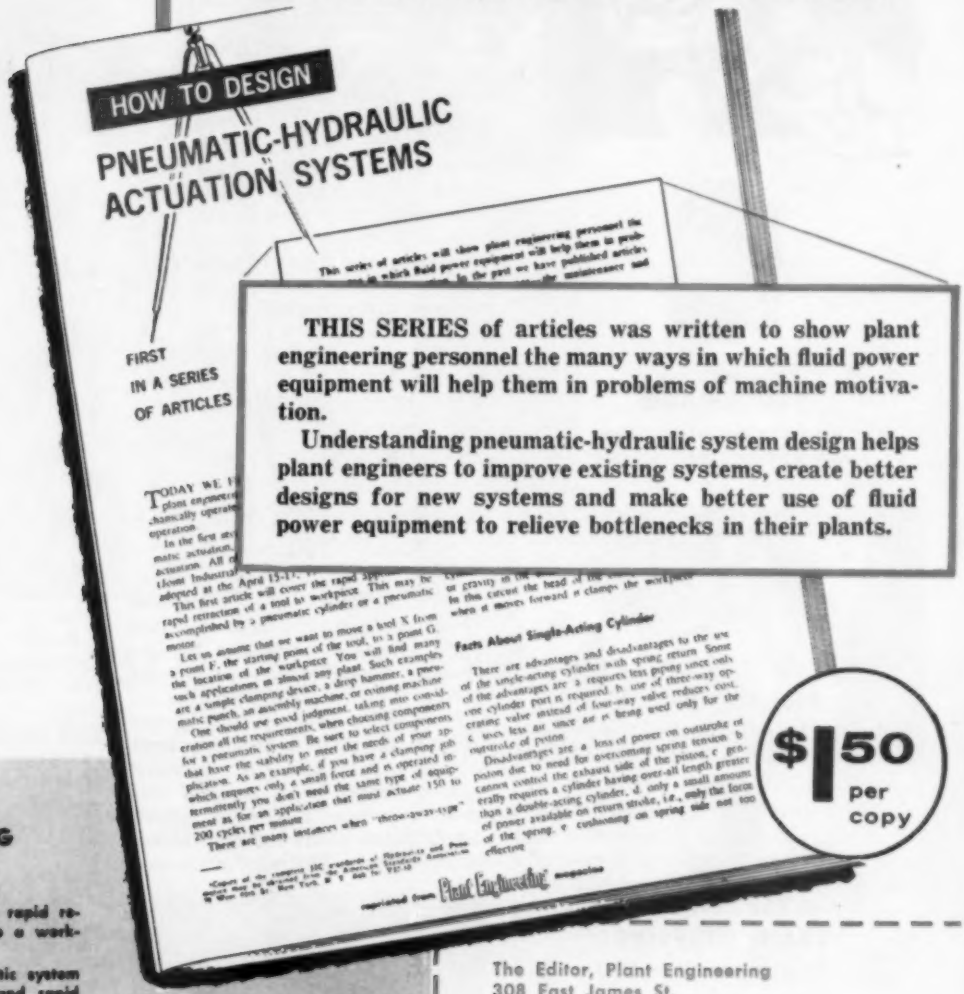
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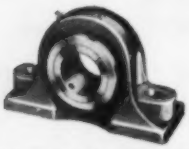

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PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

range from 22½ to 36 in. long, 6 in. wide. Apextro Products Co.

For details, circle 48 on Post Card

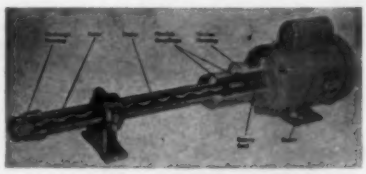
BUILDING PRODUCTS reduce installation, maintenance costs

Greater economy without sacrifice of aesthetic and functional advantages are claimed for two redesigned building products: a 0.032-gage V-beam roofing and siding sheet and a lightweight, extruded gravel stop system. The embossed V-beam sheet is available with or without Alumalure baked enamel finish. It features lighter weight with deep configurations for easy water run-off. Also, according to company, the deeper contour lets it carry longer spans between structural supports than possible with many 0.032-gage configurations. The new gravel stop extrusions come in lengths of 9 ft 11½ in., with outside joint covers and mitered corners. Aluminum Co. of America.

For details, circle 49 on Post Card

PRESSURE/SUCTION PUMP for difficult liquids

The self-priming SRM is designed primarily to handle liquids considered difficult or impossible to pump. This simple, low-maintenance unit has application where contaminated or highly viscous liquids must be moved efficiently under pressure, and is particularly adaptable to handling large particles of solid matter in suspension without damage to its stainless steel rotor or abrasion-resistant pliable stator. Action starts and stops almost instantaneously. The stator is the only



moving part. Available in 13 sizes to 26 gmp, 350 psig. Auxiliary fittings allow suction from several sources and/or delivery to several lines simultaneously at differing controlled pressures. An integral power supply, matched to the pumping capacity of each size, is rated from ⅓ to 2 hp. Larger models to 50 gpm, driven by external power, are available. Associated Engineers, Inc.

For details, circle 50 on Post Card

TWO-WAY RADIO has greater range for industrial use

Personal Messenger can be used for personal paging in plants, as well as other "on the job" applications.

Housed in a rugged case with elastic carrying strap, radio is easily carried in hand or pocket, or is available with leather carrying case. Priced around $115.00, requires no license, may be used with Citizens' Band equipment at extended ranges. Containing 11 transistors and four diodes, it offers more than 40 per cent increase in range over similar units. It is equipped with plug-in battery case for standard pen light or mercury cells. E. F. Johnson Co.

For details, circle 51 on Post Card

CALCULATOR, single setting, speeds rotameter sizing

The Sizing-Factor Calculator provides one-setting solution of basic temperature-pressure and specific-gravity equations involved in rotameter sizing. It consists of two circular slide rules, for liquid-service equations and for gas- and steam-service equations. A simple setting of the process variable gives the sizing factor which, when multiplied by maximum desired flow of metered liquid gives value of an equivalent air or water flow at standard temperature-pressure conditions. The back of the calculator lists specific gravities of gases and materials, and pressure, volume, weight etc. conversion tables. Costs about $1.00. Brooks Instrument Co.

For details, circle 52 on Post Card

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 33-34.

CHAIN ASSEMBLY for lifting pipe, beams or tubing

Designed to minimize number of lifts required to raise and transport structural beams, pipe or tubing, this chain assembly consists of an Accoloy 125

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Circle 617 on postcard, page 33

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PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

double leg sling chain with two triangular members. From these are suspended dropper chains equipped with sling hooks, sorting hooks or any other type hook. It can be supplied with any number of dropper chains. American Chain Div., American Chain & Cable Co., Inc.

For details, circle 53 on Post Card

RETAINING RING PLIERS are safe, easy to use

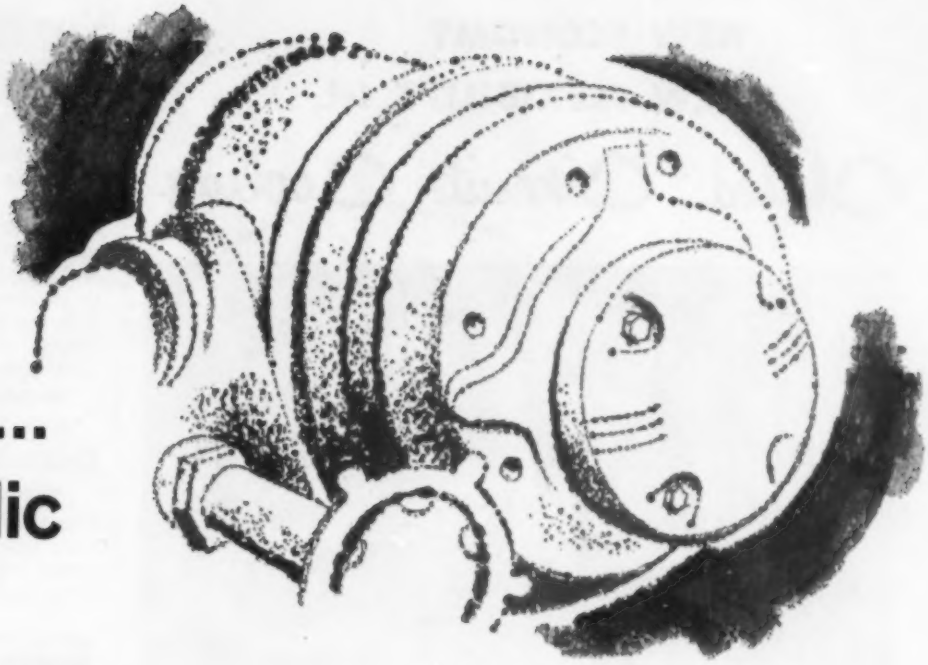
Truarc Pliers are available in three types to handle rings from 1/8 to 10 in. diam—internal type for rings in a bore or housing, external for rings

about a shaft, and universal for either internal or external rings. Plier tips are permanent, except on giant size where replacement tips are available. Field pliers, shown at top of photo, are suggested for general and maintenance use. Standard pliers below, with springs and adjustable stops, are suited for production. Owatonna Tool Co.

For details, circle 54 on Post Card

SELECTOR SWITCHES, key-operated, can be color coded

Bulletin 100, Type H (NEMA 1) and HO (oil-tight) Control Devices are available in two, three or four positions, for base or panel mountings.



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Call your Sinclair Representative for further information, or write for free literature to Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y.

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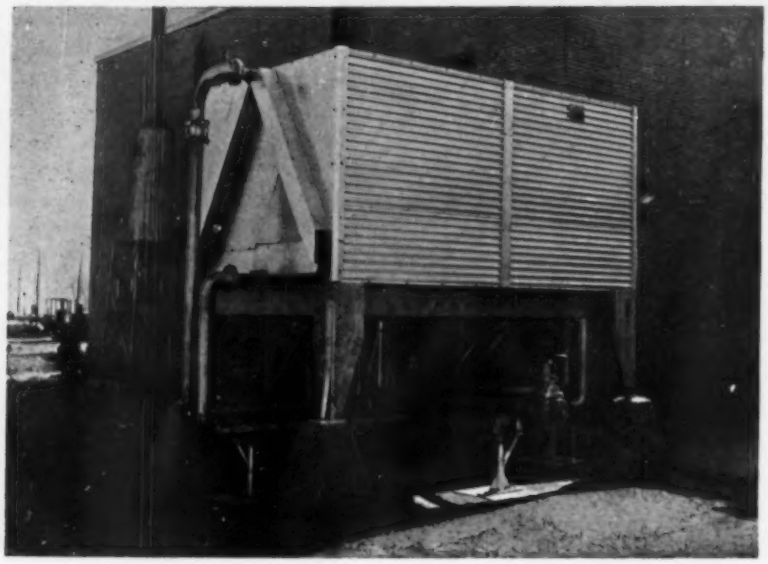
NEW FLEXIBILITY *in*

Closed Circuit Cooling



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DriCooler® Fluid Coolers

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DriCoolers are specifically designed to meet industry's varied needs for high level cooling at low costs. They are engineered to combine a high standard of heat transfer capability with economical use of applied horsepower, long service life and conservative first cost. DriCooler controls provide automatic operation in all seasons, in any climate.

This combination of positive characteristics makes DriCoolers the logical cooling equipment for modern machines and processes —engine jacket water . . . electronic tubes and data processing equipment . . . furnace doors . . . molding and extruding equipment . . . air compressors . . . welding equipment . . . anodyzing tanks . . . quenching baths . . . transformers . . . many process requirements.

For complete details on DriCoolers—or on Marley's complete line of water cooling towers—see your Marley engineer or write direct. You'll find that Marley helps you make the most profitable use of your logical cooling medium, whether it be air or water.

Ask for Bulletin DFC-61.

the Marley company

Kansas City, Missouri

Circle 620 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

Group coding is possible since ferrules come in eight colors. Key-operated selector switches include melamine contact blocks available with contact arrangements varying from 1-N.O. or 1-N.C. to 4-N.O. and 4-N.C. in panel-mounted units and with 1-N.O. and 1-N.C. or 2-N.O. and 2-N.C. contacts in base-mounted units. The Clark Controller Co.

For details, circle 55 on Post Card

CHAIN WRENCH can be operated in either direction

The C-12 Chain Wrench for ⅛- to 4-in. pipe features double jaw construction giving ratchet-like action in either direction. Only ¼ in. clear-

ance is required, making it suitable for limited access applications. Length of chain is 15-¾ in. Extra links may be added. Handle is 12-⅞ in. long. Ridge Tool Co.

For details, circle 56 on Post Card

HAMMER, shock absorbing, has interchangeable tips

Five interchangeable tips give the multi-faced Shure-Drive a range of hammer power from rugged sledge force to precision sensitivity. Replaceable tips fit one basic holder, are color-coded to conform to durometric hardness specifications. Hammer uses floating head to reduce rebound, produce more work with less effort. Ramset Fastening System.

For details, circle 57 on Post Card

PORTABLE HEATER delivers heat within 3 sec

This low cost portable heater, using kerosene or No. 1 fuel oil, puts out 75,000 Btu per hour. Its portability suits it for warming workers, cold engines, repair shops, spot heating etc. Operation is by plugging into a 115 v outlet. Since fuel is completely con-

COMBINES...

Fulflo

Honan-Crane

Delpark

Michiana

IN THE BROADEST LINE OF INDUSTRIAL FILTRATION EQUIPMENT

From Air to Zinc Cyanide — a CFC filter is installed on every type of industrial filtration job. Ranging from a 5 CFM FULFLO air filter to automated DELPARK coolant filters for central systems handling hundreds of pounds of sludge every hour, CFC equipment is used for every filtration operation — for air, oils, coolants and chemicals.

CFC filters are the choice of industry because they have been proven under diverse and critical operating conditions . . . because CFC has 25 years of design engineering experience in every type of filtration . . . because, from over 4311 standard models and media, plant and design engineers can be sure they will get the best filter available, at the lowest cost. Dept. PE

COMMERCIAL FILTERS CORPORATION

MELROSE 76, MASSACHUSETTS

PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

Circle 621 on postcard, page 33

Here's an extra-sturdy threader that's instantly ready to thread any of the three conduit sizes most used. Each die-set is locked in place . . . can't get lost. Yet dies are easy to reverse for close-to-wall threading. Centering guide keeps conduit straight for true-threads every time. Twin handles double leverage for easy thread cutting. Choice of long-wearing alloy or high-speed steel dies. Straight conduit dies also available.

Call your distributor today. For your convenience he maintains a complete stock of RIDGID Work-Saver Pipe Tools and parts.

RIDGID

The Ridge Tool Company • Elyria, Ohio, U.S.A.

Circle 622 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

sumed no dangerous fumes are given off and no vent is needed it is stated. The heater is designed to run 10 hr steadily or, with optional thermostat, 15 to 20 hr. Master Vibrator Co.

For details, circle 58 on Post Card

WORK TABLES for use in "clean rooms"

Cleanline Work Tables have Formica or stainless steel tops and chrome plated pedestal bases to resist contamination and minimize dust collection. Built-in electrical outlets can

be included, as well as other services (air, gas, etc.). Standard lengths are 4, 6 and 8 ft; widths are 34¾ in. with electrical connections, 28¾ in. without. Bulletin CWT761 gives information. Controlled Environment, Inc.

For details, circle 59 on Post Card

FUEL OIL ADDITIVE reduces smoke

Furnace Kleen, when added to fuel oil, is claimed to reduce smoke and increase furnace efficiency. Two formulas are available: F.O.A. for No. 2 to 5 fuel oil and B.O.A. for No. 6 or Bunker C oil. Unlike other additives that must be placed at the bottom of the fuel tank or fed to the burner, Furnace Kleen is added on top of the fuel—a gallon to 1,000 gal of fuel. Immediate dispersement takes place, even into added gallonage later. Having a Pinsky-Martin closed-cup rating in excess of 148 F, it is less hazardous than standard additives with a rating of 70 F, manufacturer points out. Additional advantages claimed are: prevention of fuel tank corrosion by rust, dissolving and dispersing of sludge, emulsifying of moisture in fuel tank, and cleaning of nozzles, strainers, pumps. Solar Chemical Co.

For details, circle 60 on Post Card

DOUBLE-BARREL MIXER blends dry materials

This double-barrel mixer is a fast, heavy-duty unit for intensive blending of dry, powdered, or granular materials. It is claimed successful for blending retarder and fiber in wall plaster, mixing lightweight aggregates in plaster and

cement, mixing ingredients for cold water paints, and other difficult applications. Its mixing tub is heavy steel plate, adjustable stuffing box seals are furnished around the rotor shaft, rotors are carried on roller-bearing, and pillow boxes mounted on steel brackets. Six models are available, three

are V-belt driven smaller units and three larger units operated from worm gear reducers. Capacities range from 20 to 120 cu ft. The J. B. Ehrsam & Sons Mfg. Co.

For details, circle 61 on Post Card

SUBMERSIBLE PUMP is space-saving, silent

The FloWay Submersible Pump, for use where space is limited, silence required, or booster service needed, may be cut into a flow line, placed in a vertical or horizontal position, and installed in any depth well, or under streets, park areas, or floors where pump houses are impractical. The waterproof motor and multi-stage bowl are close-coupled and sit at the end of the pipe submerged in fluid, thus eliminating pumping sounds. It handles viscous or nonviscous, corrosive or noncorrosive fluid. Sizes range from 25 to 300 hp, at 1750 and 3600 rpm, 100 to 4000 gpm, 0 to 1000 psi. Bulletin 21 gives data. Fiese & Firstenberger Mfg. Inc.

For details, circle 62 on Post Card

SOFT PACKING is Teflon treated

Garlock 5555, announced as ideal for solvent and mild acid, alkali service, is a plastallic packing with powdered Teflon-asbestos fiber core and single nonmetallic braided asbestos yarn jacket, impregnated with Teflon suspensoid. Its plastallic core permits use as a valve stem ring where out-of-square sizes are required. The packing is available in sizes of ⅛ to 1 in. Garlock Inc.

For details, circle 63 on Post Card

FLASHLIGHT converts into circuit tester

This flashlight converts into a circuit tester by simply plugging in a cord provided and connecting two clips on the cord to fuses, circuits, electronic equipment, etc. If the

flashlight turns on, the circuit is all right—if not, the circuit is broken or deficient in some way. Costs less than $4.00. A. V. Olson Mfg. Co.

For details, circle 64 on Post Card

HORN, FLASHER warn of vehicle back-up

Dynalert is for use on rolling and track-type vehicles—on construction jobs, docks, in warehouses—or for signalling and alerting on overhead cranes, safety gates, etc. Horns and lights are available in two types: automatic, with switch mounted on transmission speedometer drive, and actuated by vehicle's rearward movement (with or without engine running); and self-pulsing with limit switch, mounted so reverse shift lever triggers it. Horn and flasher are housed in cast aluminum casing. Atkinson Dynamics.

For details, circle 65 on Post Card

FLEXIBLE GROUT keeps joints from cracking

Fast and easy to use, Miracle Flexible Grout bonds ceramic tile, mosaics, marble, slate etc., providing semi-flexible joints claimed not to crack when subjected to normal flex-

Work Gets Done Faster with a

RIDGID®

TRISTAND VISE

on the job!

Here's a solid workbench to speed all cutting, threading and reaming out on the job. No other vise offers as many work-saving features as this RIDGID No. 40-A Tristand Yoke Vise. • Big, rugged malleable vise base has 3 bending grooves, 6 tool slots, rear pipe rest and a ceiling brace screw for absolute rigidity if legs aren't bolted down. • Base overhangs front legs for clear tool swing. • Extra-large yoke latch opens for easy, fast insertion of long pipe lengths. • Replaceable LonGrip jaws give, slip-proof grip. • Handy tool tray locks legs open during use but folds for easy carrying with legs snap-chained together. RIDGID No. 450 Tristand Chain Vise with ⅛" to 5" capacity is also available.

EASY TO FOLD

EASY TO CARRY

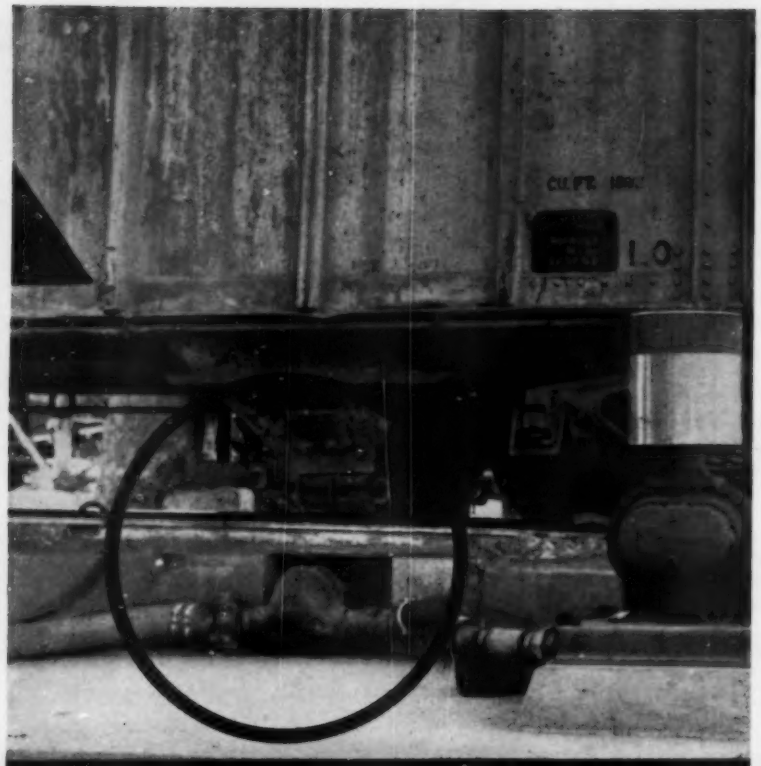
Extra Rigid in Use

Call your Distributor today. For your convenience, he maintains a complete stock of RIDGID Work-Saver Pipe Tools and parts.

RIDGID

The Ridge Tool Company • Elyria, Ohio, U.S.A.

Circle 623 on postcard, page 33



Low-cost pneumatic conveying unit needs only 17 inches clearance to mount beneath tracks. Unloads at rates up to 300 bbls./hr.—conveying distance up to 125 feet.

NEW! FULLER-KOMPACT PUMP offers fast, low cost car unloading

The popular and widely used Fuller-Kinyon Pump design has now been modified to offer a new model with advantages never before available with mechanical or other types of pneumatic systems. The new Fuller-Kompact pump is offered as part of a complete package, including air supply, to unload portland cement and similar dry pulverized materials. Unloading operation from hopper bottom car may be to silo, truck, or trailer.

The FULLER-KOMPACT, Model FK-62, has been developed specifically for use under track for easy unloading hopper-bottom cars . . . low silhouette eliminates extensive track pit. Requires only a shallow trench less than two feet deep. Units are available with V-belt or direct drive, powered by electric motor or engine. Conveying rate to 300 bbls. hourly—conveying distance to 125 feet.

The FULLER-KOMPACT pump meets Fuller standards for high quality, performance and dependability. Only one moving part assures low maintenance with original cost competitive with other types of equipment.

For specific information on applying the Fuller-Kompact to your operation, write to Catasauqua, Pa. outlining your requirements.

See Pit & Quarry Handbook for further details and specifications

3973
P-176

FULLER COMPANY
138 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller
. . . . pioneers in harnessing AIR

Circle 624 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 172)

ing and movement of wood sub-surfaces. It is suggested for bonding exterior ceramic tile where temperature range crack hard-setting grout. It is supplied as a powder aggregate and liquid latex packed separately in one container, in white or gray. Miracle Adhesives Corp.

For details, circle 66 on Post Card

MULTI-PURPOSE TOOL works as wrench, vise, holder

This multi-purpose tool can serve as an internal spud wrench, a vise, a tube holder, and for other uses. Its lower portion is an expansion type spud

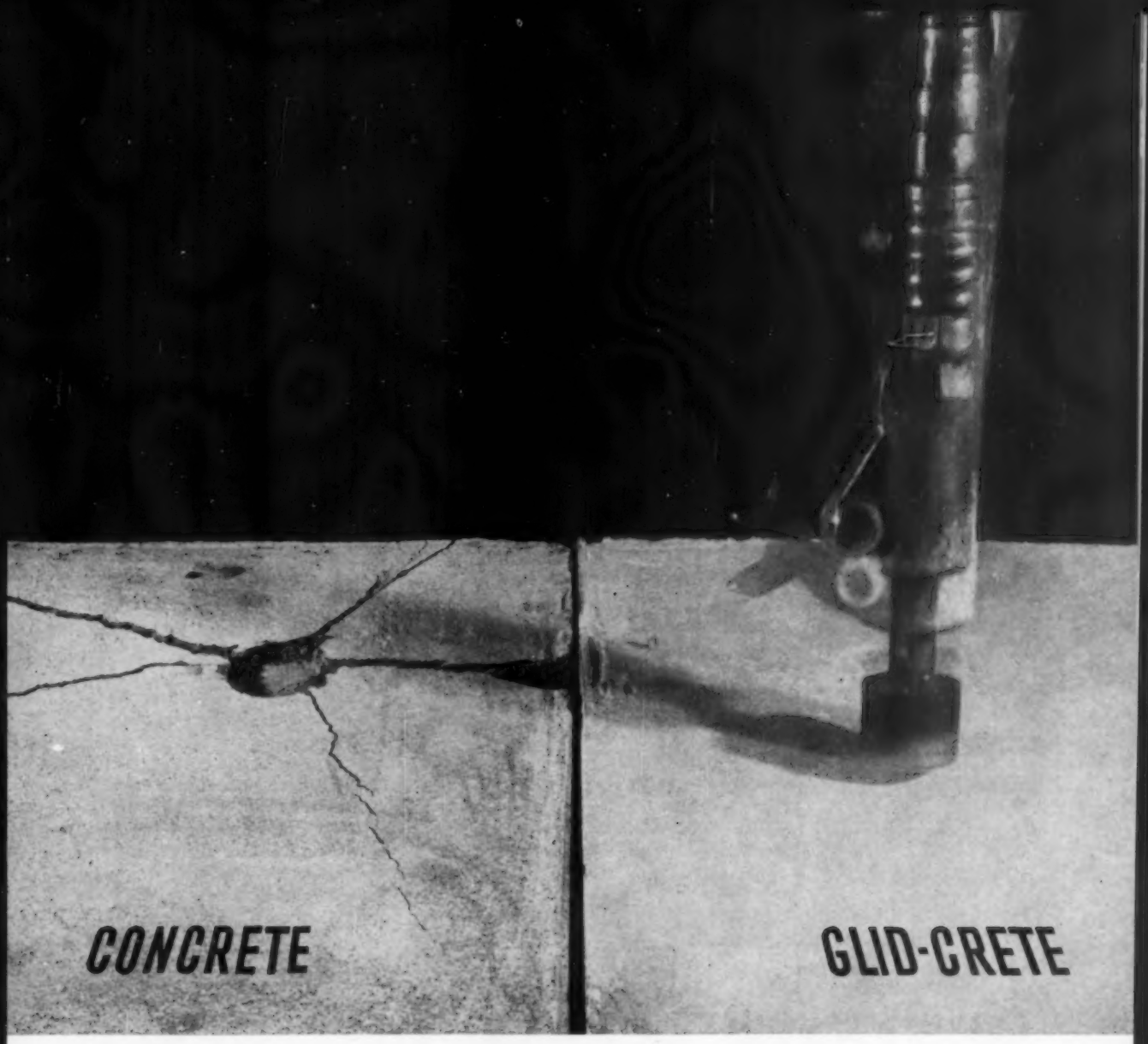
wrench taking up to 3-in. dimensions, and has knurled edges for a no-slip grip. The inside is grooved for a vise grip to hold pipe and other parts, and can be held in the hand or located in another unit. The other end provides for holding pipe or tube having an outside diameter of 3/8, 1/2 and 5/8 in. and can be used for threading, cutting, sweating or flaring. Good Mfg. Co.

For details, circle 67 on Post Card

HIGH VOLUME PUMP for light, heavy viscosity corrosives

With an all stainless steel fluid section, Pogo Hi-Volume SS can handle chemicals, foods, dyes, acids, water mixes, caustics, solvents, and cleaning fluids. It pumps from 55-gal open top containers and comes with cover mounting (shown) or with clamp-on mounting. Air operated (with five to one pumping ratio) its delivery for continuous duty is 1.75 gpm, with maximum delivery rated at 2.5 gpm. Air consumption is 2 cfm per gallon of material pumped. Available with or without pump elevator and material agitator. Binks Mfg. Co.

For details, circle 68 on Post Card



Air hammer can't crack ¼" of GLID-CRETE

An air hammer with a 2" round steel tamper pounded bare concrete to pieces . . . but couldn't crack the ¼" topping of GLID-CRETE, even after several minutes of hammering.

Eight times stronger, five times harder than concrete, GLID-CRETE is the ideal topping for floors, ramps and driveways that must take high impact and heavy traffic. And its abrasion, chemical and weather resistance make it suitable for all industrial applications. Non-slip, too.

GLID-CRETE is a 100% solids epoxy compound that trowels on to vertical and horizontal surfaces, adheres solidly and provides a durable, lasting surface. May be used for patching as well as complete surface coverage.

Write today for complete information.

QUALITY Glidden PRODUCTS

THE GLIDDEN COMPANY
COATINGS AND RESINS DIVISION
900 Union Commerce Building • Cleveland 14, Ohio
In Canada: The Glidden Company, Ltd., Toronto, Ontario
Circle 625 on postcard, page 33

Sent free — brochures on all Glidden Protective Maintenance Coatings.

A Plant Moves

(Continued from page 137)

7. (March 13): an outside rigging crew will set up the equipment, while our regular crews set up their tool and die racks;

8. (April 3): move the finishing crew up to the new plant.

Besides the riggers, we used an outside trucking firm to move the heavy equipment. This took about seven days. Our two-week schedule was designed to allow us seven days for unforeseen delays. During the two weeks of moving and installation, orders were finished and delivered from the old plant. The stockpile at the new plant allowed us to pick up production with no time lag.

Maintaining production during the move was one of two problems that we solved. The other one was the long-range plan for the addition of new equipment around our normal work flow.

Once we were in full production at the new plant on March 8th, we began construction of a dip line to double our finishing capacity. We had to erect scaffolding that would not interfere with the spray finishing operation, a ticklish job, in view of the amount of equipment and its location. We put in a 150-ft overhead conveyor line, degreasing and dip tanks, and a complex baking oven.

Working parallel to the spray line, we finished the job in thirty days. Now we have two finishing lines in operation, and in case of failure on one, the other can take over during repairs. To make possible a quick color changeover, we constructed mobile dip tanks. Now, when we want to run a new color, we pull one tank out of line and pull in another. This represents a 60 per cent time saving on our color processing. **End**

HANSEN

SERIES HK® QUICK-CONNECTIVE

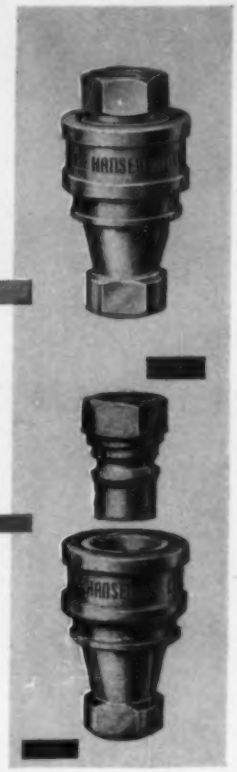
TWO-WAY SHUT-OFF COUPLINGS

QUICK FLUID LINE CONNECTION OR DISCONNECTION

WITH

INSTANT AUTOMATIC FLOW OR SHUT-OFF

Instantly shuts off both sides of line... prevents loss of liquid, gas or pressure



When Coupling is disconnected, identical valves in both the Socket and Plug provide instant shut-off of gas or liquid. To eliminate leakage or spillage during disconnection, the Coupling is so designed that shut-off takes place *before* the Plug separates from the Socket—and *before* the seal of the Socket itself, provided by the Socket "O" Ring, is broken.

In reverse, when Coupling is connected, the "O" Ring in the Socket completely seals Coupling *before* valves release flow of fluid from both sides of line—thus eliminating possibility of spurt of gas or liquid during instant of connection.

Available in brass or steel with female pipe thread connections from ⅛" to 1½" inclusive—also up to 1" in stainless steel.

Write for the Hansen Catalog

Here is an always ready reference when you want information on couplings in a hurry. Lists complete range of sizes and types of Hansen One-Way Shut-Off, Two-Way Shut-Off, and Straight-Through Couplings — including Special Service Couplings for LP-Gas, Steam, Oxygen, Acetylene, etc.

Representatives in Principal Cities ... see Yellow Pages

SINCE 1915 QUICK-CONNECTIVE FLUID LINE COUPLINGS

THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 35, OHIO

Circle 626 on postcard, page 33

100 Million Gallons

(Continued from page 130)

The resultant 120 F gas is then cooled to 40 F by the direct expansion aftercooler and because of this it was possible to save the 100 million gallons annual usage.

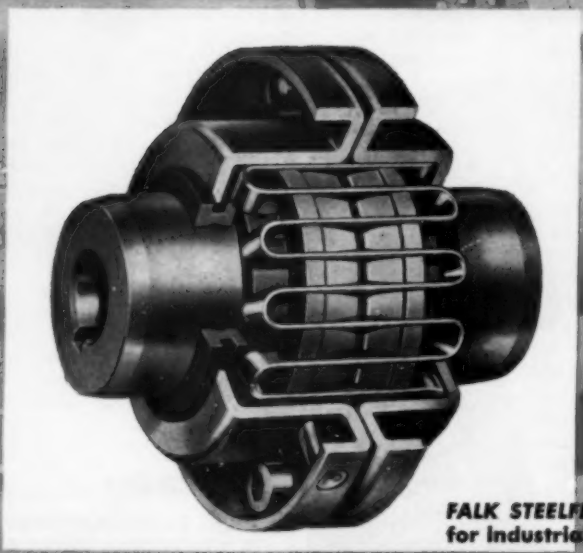
Another principle of heat exchanging has to do with the afterheaters or a pipe line heat exchanger. This was provided to protect against distribution line condensation. Heat removed from the gas in the direct expansion aftercooler was transferred by the refrigeration compressor to its condensor cooling water. This hot condensing water was circulated through the afterheater warming the previously chilled gas, thus restoring not only its specific volume but also cooling the hot condensing water and eliminating heat additions to the reclaimed water system.

This entire system has utilized principles of heat exchanging which allow excellent thermal efficiencies, and the final result has been gratifying since the reduction to 40 F removed sufficient quantities of water vapor in the Exothermic gas that there was no longer any need for enriching the mixture with costly Endothermic gas. Thus, not only were the original water costs saved, but also significant amounts in natural gas costs.

The desire for utility conservation embodies real challenges to engineering ingenuity and can frequently be accomplished with relatively small expenditures and encompass greater savings than anticipated. **End**

FALK

A GOOD NAME IN INDUSTRY



FALK STEELFLEX COUPLINGS
for industrial applications...large or small

Giant Falk Coupling smooths out steel blooming mill performance

On a blooming mill at the Copperweld Steel Company plant in Warren, Ohio, installation of a large Falk Steelflex coupling between motor and pinion stand eliminated troublesome noise and vibration which threatened to damage mill machinery. Transmitting 5,000 hp at 50/100 rpm, this is not the largest Falk coupling... others are designed to transmit up to 130,000 hp at 100 rpm.

This installation and others like it prove the Falk concept of shaft coupling design—namely, a modern shaft coupling must contribute to the successful performance of the machinery system.

What does this mean to you? Just this: On large machines as well as small, the exclusive Falk grid-groove design does make a difference, and the difference is torsional resiliency with the strength of steel...reason enough to specify Falk Steelflex couplings as "long life" insurance for your connected machinery.

Falk Steelflex couplings are available in standard designs in 34 sizes for applications from .3 hp at 100 rpm to 130,000 hp at 100 rpm, with excellent delivery. Write for Bulletin 4100.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

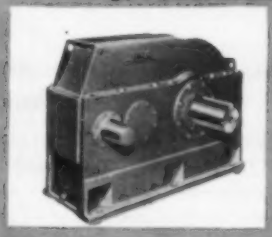
MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in most principal cities

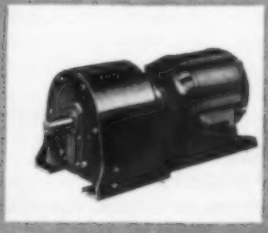
• • •

A Point to Ponder... When you need gear drives or shaft couplings of "FALK OR EQUAL" quality, where but from Falk can you get the "OR EQUAL"?

Other members of America's First Family of Power Transmission Products



SPEED REDUCERS. Parallel Shaft up to 3500 hp. Ask for Bulletin 1100. Also Right Angle and Concentric Shaft designs.



ALL-STEEL MOTOREDUCERS —up to 75 hp. Horizontal, Vertical, and Right Angle. All-Motor and Integral Types. Ask for Bulletin 3100.

SHAFT MOUNTED DRIVES —up to 125 hp. Ask for Bulletin 7100. Also Flange Mounted and Screw Conveyor Drives.

FALK, STEELFLEX and ALL-MOTOR are registered trademarks.

Circle 627 on postcard, page 33

MODERNIZE–
ECONOMIZE–
STANDARDIZE–

...WITH these electrical systems by

STANDARD
TRADEMARK

TIME CONTROL SYSTEMS

PUBLICATION NO. 250

Centrally controlled, synchronized clocks, time clocks and job time recorders reduce production costs by registering time on a consistent basis throughout entire plant. Yard lights, utilities, signals programmed for automatic operation reduce personal attention required . . . eliminate human error.

FIRE ALARM SYSTEMS

PUBLICATION NO. 251

With automatic "locator" feature that permits instant identification of trouble area . . . confines fire or sprinkler damage by making possible immediate action.

ELECTRICAL TEST EQUIPMENT

PUBLICATION NO. 247

Voltage distribution panels, test stands, control consoles—custom designed by specialists—for lab or production line test use.

EMERGENCY LIGHTING

PUBLICATION NO. 243C

For protection of personnel, plant and property.
Instantaneous, automatic operation—electrically supervised, 100% dependable, with automatic recovery.

THE STANDARD ELECTRIC TIME COMPANY
89 LOGAN STREET, SPRINGFIELD, MASSACHUSETTS

Circle 628 on postcard, page 33

NEW BOOKS
for the plant engineer

Mechanical Design

OPTIMUM DESIGN OF MECHANICAL ELEMENTS by R. C. Johnson. Size 9¼ by 6¼ in.; 523 pp; illustrated; clothbound. Published by John Wiley & Sons, Inc., 440 Park Avenue South, New York 16, N.Y. Price $11.50.

THIS BOOK whose text includes mathematical equations is presented at a level associated with senior and graduate study. Its author has not only teaching experience but has done consulting work for industrial firms.

The first chapter contains an introduction to the optimum design technique. A few of the other topics of the other 12 chapters are as follows: Optimum choice for method of analysis; a statistical consideration for factor of safety; optimum design of torsion shafts; optimum design of beams; optimum design of gears, and effects of manufacturing errors on product performance.

Pile Technology

PILE FOUNDATIONS by Robert D. Chellis. Size 9¼ by 6⅜ in.; 704 pp including index; illustrated; clothbound. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N.Y. Price $16.00.

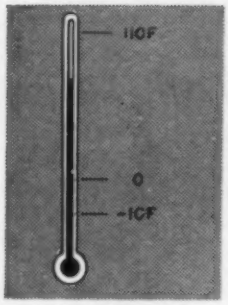
THE SUBJECT of pile foundations is covered extensively in this book authored by an experienced structural engineer. Its contents include information on design, selection, grouping and spacing, deterioration and preservation, driving, and tests.

Various types of piles employing such materials as wood, concrete, and steel are discussed. In the remarks on

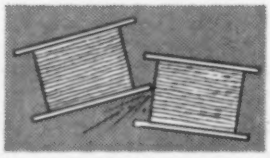
"Well young man, it's a darn good thing you were wearing your safety glasses!"

CABLE TALK

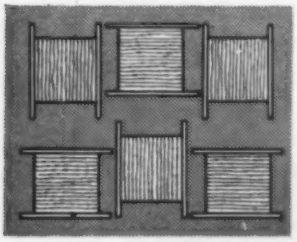
6 tips to help you make the most of your investment in wire and cable

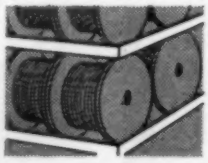


1. Avoid extreme temperatures –below 10F and above 110F (unless cable is specifically designed for this purpose). Low temperatures are seldom harmful to cable, but when they are combined with impact, flexing or other mechanical action, it's possible that the cable may be damaged by cracking, flaking or complete rupture of the coverings. Excessively high temperature, all by itself, can materially shorten the potential service life of stored cable. Thermoplastic components may soften and flow; rubber and many other materials undergo chemical and physical changes at high temperatures. You can avoid this problem by not storing cable near heating units, steam pipes, etc.

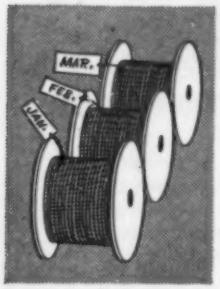


2. Avoid mechanical impact and crushing. Wire on a reel can be rendered useless by allowing the flange of another reel to crash against it. Arranging the stored reels in a crosshatch pattern is the simplest way to avoid this kind of accident. If space is at a premium, the reels may be stored in trays that allow only the flanges of adjacent reels to contact.

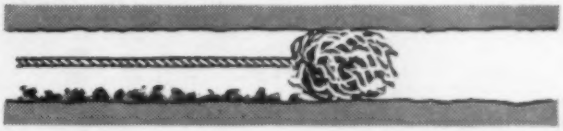




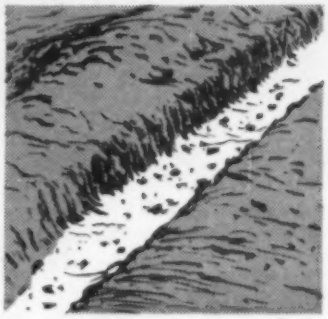
3. Use the oldest stocks first. Very few materials improve with age, so the sooner you use stored cable the longer it will last in service. Also, the less time a cable spends in storage, the less chance there is for damage. Keep rotating stocks so that the newest cable goes to the end of the line.



4. Swab conduit before pulling wire A remarkable amount of abrasive material–nails, glass and such–can accumulate in conduit, pipe or duct before the wire is pulled through. And pulling a wire or cable through such litter could damage it severely. If you pull a swab through the conduit ahead of the wire to clear the way, you'll eliminate a big source of hidden installation damage.



5. "Direct burial" doesn't mean "on top of anything" The specification "direct burial" on a cable doesn't mean that you can afford to bury the cable directly on top of whatever you might find in the earth. Trenches should be cleared of rocks and broken glass before the cable is buried. Freezing and thawing can make rocks shift position, and, possibly, exert enough pressure on the cable to cause premature failure. The same danger exists when wires that cross underground rest on each other. Moral: clear trenches before burying cable, bed the cable in sand, and keep crossed cables separated.



6. Pick the strongest component when pulling cable When wire or cable is being pulled-in, either through conduit or aerially on poles, it's essential to put all the pulling tension on the strongest part of the cable assembly. Ordinary single-conductor material should have pulling tension applied to the bare conductor. Applying tension to the covering materials tends to stretch them, and can lead to breaks in some cases. Always pull preassembled aerial cables by the messenger, not by the insulated conductors. Interlocked-armor cable should never be pulled by the armor, since this may cause severe damage by unlocking the armor.

* * *

This collection of ideas comes from many years of probing into wire and cable problems–and solving them. It's likely that we've come across some problems just like yours, and together we could probably work out a fine solution. So, please give us a call, or write Anaconda Wire and Cable Company, 25 Broadway, New York 4, New York. Department EFL-1-PE. 61304

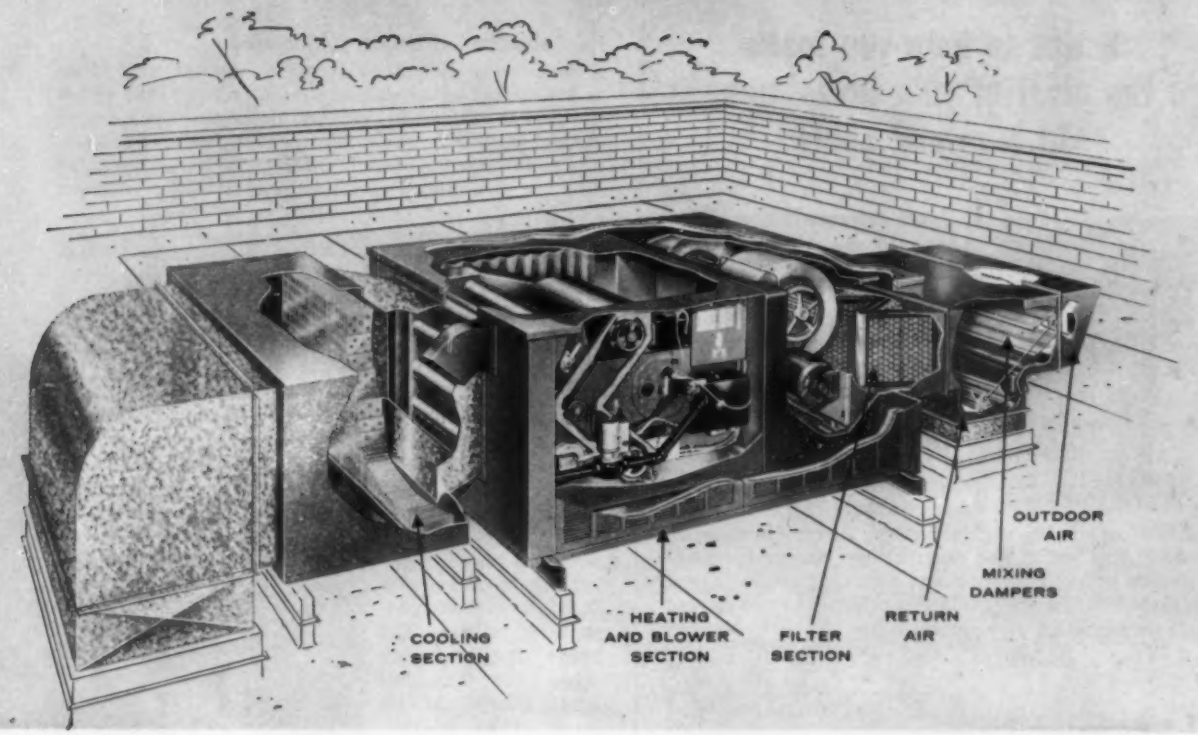
ASK THE MAN FROM

ANACONDA®

FOR TECHNICAL ASSISTANCE ON WIRE AND CABLE PROBLEMS

Circle 629 on postcard, page 33

new from LENNOX



outdoor units FLEXIBLE enough to handle any heating–cooling–ventilating job

Flexibility of use

1. Heating-cooling-ventilating with manual or automatic dampers for outdoor air.
2. Heating and ventilating with or without filters and with manual or automatic dampers to proportion fresh air and return air.
3. Heating only, with or without filters.

From a space-saving roof top or ground slab installation, use this equipment as a central unit . . . or in multiples to serve different areas. Each section is completely weatherproofed and insulated. Sections come completely assembled, ready to be bolted to each other.

Flexibility of output

280,000 to 1,000,000 Btuh heating.

Air volume of 3,000 to 15,000 cfm.

8 to 35 tons cooling (installed initially or added later).

Can serve up to 20,000 sq. ft. of floor space.

Flexibility of fuel

Gas, oil or combination burners with either manual or automatic fuel changeover.

Low silhouette

Even the *largest* unit is only 58" high installed. This includes flue outlet. Induced draft combustion system is built-in, eliminating a conventional flue.

"Free" cooling

Many days of the year, cooling is needed in a building even though outdoor air temperature is relatively low. In these cases, Lennox equipment brings in large volumes of outdoor air to cool the building without operating the cooling compressor . . . a big saving.

LENNOX a single source for heating, ventilating, air conditioning

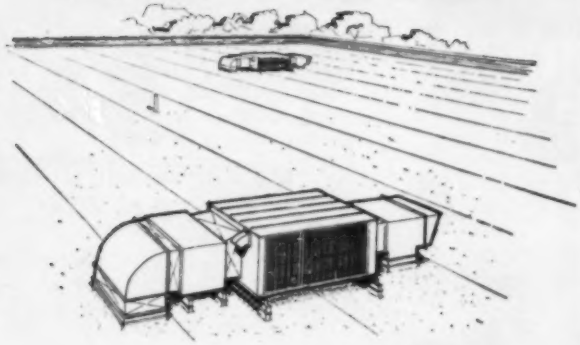
Circle 630 on postcard, page 33

Don't be satisfied with less than

LENNOX

on the

BIG JOBS



On big jobs, the so-called "little things" are still mighty important... things that add up to highest quality, extra convenience. Here are a few more reasons for specifying Lennox on your next job:

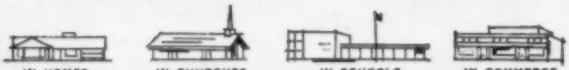
- *Exclusive Lennox-designed controls.* You get equipment *and controls* from one source. Room-mounted control center includes thermostat and convenient minimum position control for dampers.
- Protective service cavity for burners; a maintenance man's joy.
- Stainless and aluminized steel in heat exchangers and the combustion and induced drafts blowers. (Blowers welded to shaft to prevent slipping.)
- Refrigerant is sub-cooled in air-cooled condensing units. This, plus extra cooling coil surface, results in efficiency comparable to costlier water-cooled units.
- Time-tested components, proved in hundreds of installations throughout the world.

The complete Lennox line, and your Lennox representative, will make your designing and buying job easier . . . one central source for direct-fired heaters up to two million Btuh . . . cooling and ventilating for any job.

Don't be satisfied with less than

LENNOX

HEATS, COOLS, TREATS AND MOVES AIR



LENNOX INDUSTRIES INC., EST. 1895—MARSHALLTOWN, IA.; COLUMBUS, O.; SYRACUSE, N.Y.; DECATUR, GA.; FT. WORTH, TEX.; SALT LAKE CITY, UTAH; LOS ANGELES, CALIF. LENNOX INDUSTRIES (CANADA) LTD.—TORONTO, MONTREAL, CALGARY, VANCOUVER, WINNIPEG.

NEW BOOKS

soil strengthening there is information on the use of electricity for electroosmosis and electrolysis. Material on ship impact and wave forces on piles has been expanded in this edition.

Sixty cases of actual failures are presented briefly with comments on causes, preventions, and remedies.

In addition to tables in the text, a separate section has tabulated data on temporary compression, hammers, piles and jetting. Standard specifications also appear in the book, and many references are listed at the end of the book.

Vest-Pocket Information

VEST-POCKET LIBRARY BOOK. Size 5⅝ by 2⅝ in.; approx. 192 pp; flexible cover. Published by Ottenheimer Publishers, Inc., 4805 Nelson Ave., Baltimore, Maryland. Price $1.00.

MATHEMATICAL tables and trigonometric formulas are contained in this handy pocket-sized book. It includes six place tables on natural trigonometric functions, logarithms and antilogarithms, and logarithmic trigonometric functions.

Special Automatic Equipment

MANAGEMENT PROBLEMS IN THE ACQUISITION OF SPECIAL AUTOMATIC EQUIPMENT by Powell Niland. Size 8⅜ by 5⅛ in.; 336 pp including index; clothbound. Published by Harvard Business School, Division of Research, Boston 63, Mass. Price $5.00.

FIELD INVESTIGATIONS collectively had an important role in making possible this study. One of the facets of special equipment acquisition discussed in this book is debugging. Discussion does not point out mechanics of debugging. It deals with the minimization of problems and expediting this problem, organizational responsibility, kinds of problems, and the importance of debugging.

Should special automatic equipment be bought or built? Comments relating to this question also appear in this book with arguments being presented for purchasing and building such equipment.

Product design is an important consideration for the acquisition and utilization of special automatic equipment. The book appropriately includes material on product design coordination.

Another of the principal topics treated in this publication is the analysis of special automatic equipment proposals. A case history of one company's acquisition of such equipment is included at the back of the book.

Conference Proceedings

TECHNIQUES OF PLANT MAINTENANCE AND ENGINEERING. Volume XII. Size 11¼ by 5⅝ in.; 349 pp; illustrated; clothbound. Published by Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N.Y. Price $10.00.

PROCEEDINGS of the Plant Maintenance and Engineering Conference held in Chicago in January of this year are reported in the 12th volume in the series of publications. It includes texts of the papers presented, and questions and answers from post-session periods.

Among the topics of conference papers are the following: the plant engineer's responsibility for building design and construction; pros and cons of outside contracting; evaluation of plant engineering and maintenance performance; keeping contamination out of air and water; and incentives

CM METEOR Electric Wire Rope Hoist

½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous hoist-duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

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CM makes them all! So you can choose a hoist that's perfectly suited to your own needs in a safe, highly efficient CM design. Three of the most popular models are illustrated. Specifications of other types and sizes on request.

CM LODESTAR Electric Chain Hoist

⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ¼ ton model weighs only 51 lbs. Heavy duty self-adjusting mechanical brake and regenerative electrical braking. Overload protection and upper-lower safety switches. CM-Alloy load chain.

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¼ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

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Circle 631 on postcard, page 33

NEW BOOKS

and measurement in plant maintenance.

Problem session remarks relate to research and development facilities; paper, steel, and textile mills; and to such types of plants as automotive, chemical, electronic, food processing, and others.

A-C Motor Controllers

MAGNETIC CONTROL OF INDUSTRIAL MOTORS by G. W. Heumann. Part 11: A-C Motor Controllers, size 9¼ by 6 approx; 327 pp; illustrated; clothbound. Published by John Wiley & Sons, Inc., 440 Park Ave. So., New York 16, N.Y. Price $9.00.

THIS BOOK contains a good bit of information on magnetic devices and accessories relating to the industrial motor control function.

Motor characteristics, important factors, in controller design are briefly discussed in the opening chapter providing some background and review for information that follows. The next three chapters deal with control of squirrel-cage, wound-rotor, and synchronous motors.

While this book stresses magnetic devices it also recognizes static switches which are part of the big picture of motor control. It contains a section on static switching and the associated logic functions.

Topics treated in the remaining two sections are motor protection; and motor branch-circuit protection.

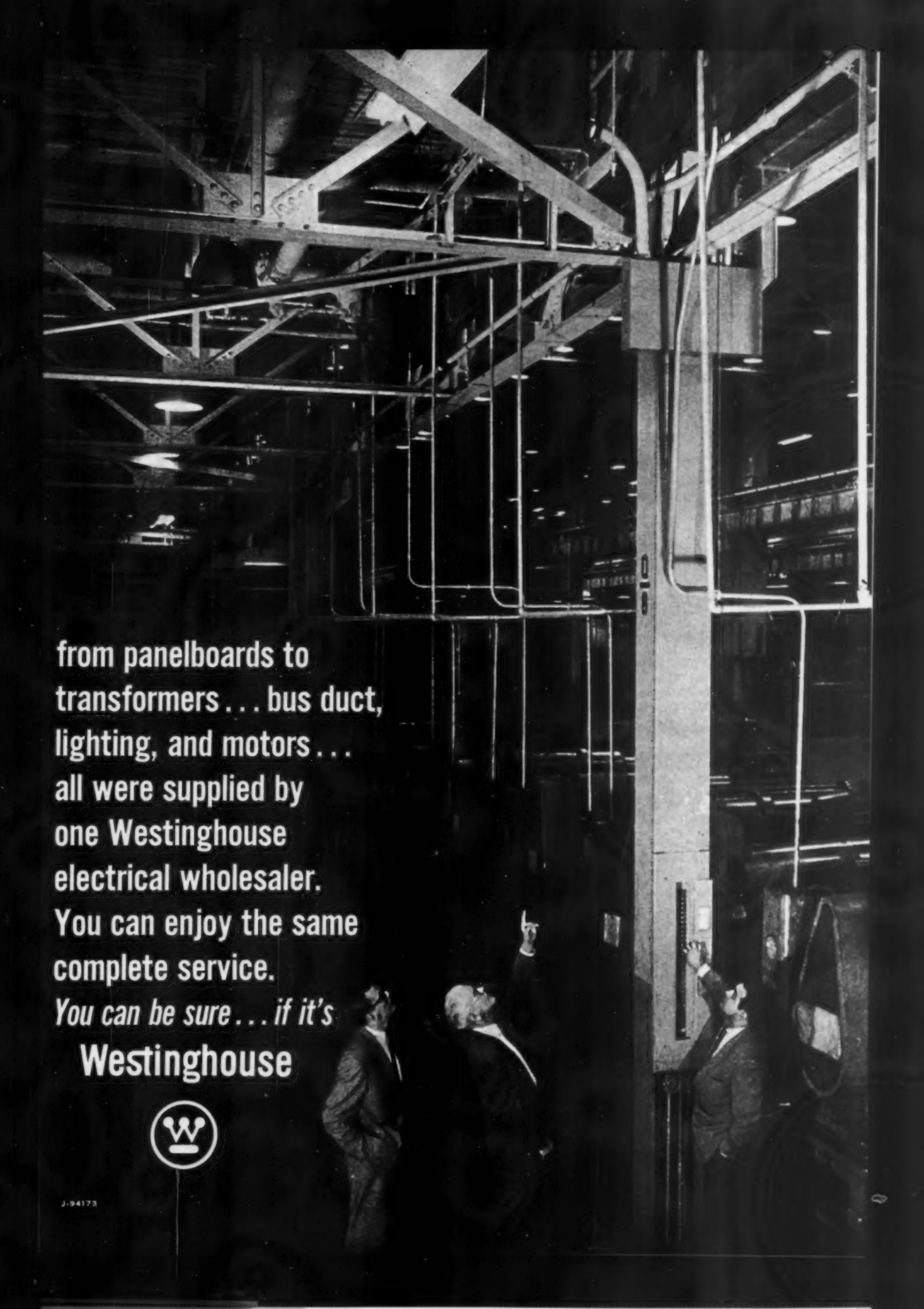
Q and A's for Electricians

1540 QUESTIONS AND ANSWERS FOR ELECTRICIANS. Size 11⅜ by 8 in. approx; 180 pp; illustrated; paper bound. Published by Arco Publishing Co., 480 Lexington Avenue, New York 17, N.Y. Price $3.00.

AS THE TITLE implies there are over 1500 questions and answers in this book. Quizzes deal with a wide variety of electrical subjects. A few of these are: electrical terminology; tools, equipment and installation methods; measurement and measuring devices; condensers, exciters, reactors and alternators; induction and polyphase motors; breakers and bus bars; lighting; operation and maintenance of transformers; and insulation.

Some tests are of the multiple choice type; others require matching. Testing material was derived from actual examinations. Information in this publication is suitable for training, self-improvement, and preparation for electricians' examinations.

Circle 632 on postcard, page 33 ➔


from panelboards to
transformers . . . bus duct,
lighting, and motors . . .
all were supplied by
one Westinghouse
electrical wholesaler.
You can enjoy the same
complete service.
You can be sure . . . if it's
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AVAILABLE *from Advertisers*

Guide to literature offered this month in ads received by PLANT ENGINEERING before the first of last month

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Economical Pumps—Brochures give details on pumps—vertical turbine, centrifugal, sump, internal gear rotary, submersible. Deming Div.

Circle 201 on Post Card

Heavy-Duty Pumps—Bulletin SP-522Z describes high-speed units for thin, thick liquids. Viking Pump Co.

Circle 202 on Post Card

New Dimension in Pumps—Design manual shows pump dimensioned to requirements. C. H. Wheeler/Griscom-Russell.

Circle 203 on Post Card

Time-Saving Pump—Data on two-speed hydraulic pump with fast ram approach. Owatonna Tool Co.

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Standard Centrifugals—Circular 190 covers pumps for general, chemical use. Dean Brothers Pumps Inc.

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Extra-Value Compressors—Facts on unit needing less upkeep for long-range economy. Ingersoll-Rand Co.

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HEATERS, HEATING

Clean, Low Cost Heating—Catalog F-975E describes Chromalox electric comfort heating equipment. Edwin L. Wiegand Co.

Circle 207 on Post Card

Fuel-Thrifty Heating Units—Product catalogs show equipment for most applications. Modine Mfg. Co.

Circle 208 on Post Card

Safe Electric Heating—Information on Electromode explosion-proof heater. Electromode Div.

Circle 209 on Post Card

FANS, BLOWERS

Belt-Driven Axial Fans—Bulletin 625PE describes fan that can be field-modified to capacity requirements. Propellair Div.

Circle 210 on Post Card

Air Moving Equipment—Bulletin 153 gives AMCA certified ratings. Air Moving & Conditioning Assn., Inc.

Circle 211 on Post Card

ELECTRICAL

Everything for Substations—Facts on complete service. Westinghouse Electric Corp.

Circle 212 on Post Card

Designed for Growth—Facts on Technical service to assure adequate electrical power for present and future. Westinghouse Electric Corp.

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Compact Circuit Breaker—Facts on QCC breakers that are smaller, lighter. Westinghouse Electric Corp.

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Metal-Clad Switchgear—Details on its features, advantages. Westinghouse Electric Corp.

Circle 215 on Post Card

Switchgear Advantages—Facts on DFS drawout switch and fuse switchgear. Westinghouse Electric Corp.

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Precision-Action Switch—Catalog 83 describes switches enclosed in rugged die-cast housings. Micro Switch.

Circle 217 on Post Card

Disconnecting Switch—Facts on V-2 switch with Teflon-coated bushings. Westinghouse Electric Corp.

Circle 218 on Post Card

Tiny Control Relay—Pub. Ed-L079-W274 on Compact 300—eight circuits fit in 2-in. wide panel. Cutler-Hammer, Inc.

Circle 219 on Post Card

High Voltage Starters—Bulletin 8210 describes push-button starters that synchronize motors. Square D Co.

Circle 220 on Post Card

Magnetic Starters—"Jig-saw" demonstrator on starters with one-piece thermal overload relay. Square D Co.

Circle 221 on Post Card

Smaller Starter—Data on features of new NEMA Size 5 magnetic starter. General Electric Co.

Circle 222 on Post Card

Enclosed Bus Duct—Facts on low-impedance duct mountable in any position. Square D Co.

Circle 223 on Post Card

Cost-Saving Bus—Alcoa Aluminum Bus Conductor Handbook. Rome Cable Div.

Circle 224 on Post Card

Wiring Profit Picture—Details on money-saving, lightweight TW aluminum wiring. Rome Cable Div.

Circle 225 on Post Card

Insulated Power Cables—Details on polyethelene-insulated cables. Simplex Wire & Cable Co.

Circle 226 on Post Card

Improved Conduit—Sample, cost data on Liquatite, flexible conduit with molded jacket. Electri-Flex Co.

Circle 227 on Post Card

Wiring Devices—Facts on Chem Marine devices made for corrosive service. Harvey Hubbell, Inc.

Circle 228 on Post Card

Improved Electrical Systems—Bulletins describe control, alarm systems, test equipment, emergency lighting. The Standard Electric Time Co.

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Modern Protection—Booklet covers fuse protection for electric power systems. Bussmann Mfg. Div.

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Buying Electrical Equipment?—Facts on assistance in finding right product. Graybar Electric Co., Inc.

Circle 231 on Post Card

Faster Ordering Service—Facts on electronic system that speeds orders to you. Westinghouse Electric Corp.

Circle 232 on Post Card

Extension Cords for All Jobs—Facts on right size, length Powr-Kord for safe use. Royal Electric Corp.

Circle 233 on Post Card

Positive-Power Equipment—Catalog on electric truck battery chargers. Gould-National Batteries, Inc.

Circle 234 on Post Card

Battery-Charger Program—Operation 90, one-source responsibility for battery, charger, service, detailed in booklet. C & D Batteries Div.

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Long-Lasting Batteries—Facts on truck battery power package. Exide Industrial Marketing Div.

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Furnace-Transformers—Facts on units designed and built for the job. Acme Electric Corp.

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TOOLS, MACHINE SHOP

Superior Flaring Tool—Facts on Ridgid tool for smoother, stronger, uniform flares. The Ridge Tool Co.

Circle 238 on Post Card

Air, Hydraulic Chucks—Rugged, durable chucks are described in catalog. Logansport Machine Co., Inc.

Circle 239 on Post Card

Grease, Dirt Knock-Out—Facts on safety solvents, KO9, KO13, for cleaning motors, switches, panels, etc. Kor Corp.

Circle 240 on Post Card

Metal Machining Oil—Facts on Chillo 30 cutting oil's superior performance. Cities Service Oil Co.

Circle 241 on Post Card

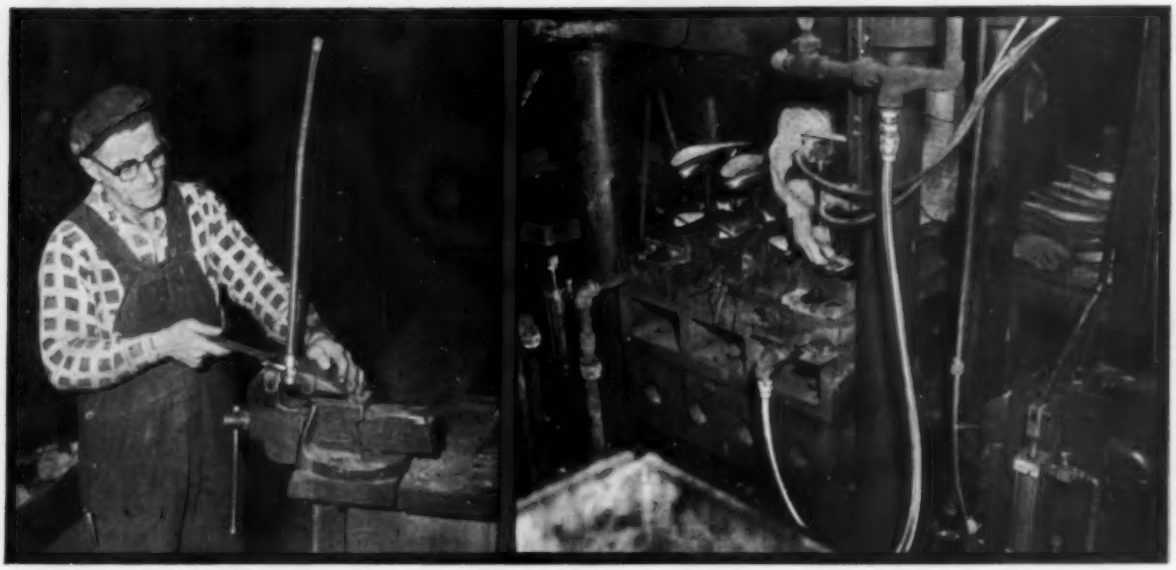
Reduce Shutdowns—Data on Duro hydraulic oil. Sinclair Refining Co.

Circle 242 on Post Card

Postage-free cards for ordering literature are on pages 33-34.

Cycling Live Steam and Cold Water Breaks Down Most Hoses... Not Aeroquip Hose of Teflon!

reports Acton Rubber Company Limited, Acton Vale, Quebec



Left: Acton mechanic assembles Aeroquip Hose of Teflon and "*super gem*" fittings.
Right: Aeroquip Hose of Teflon on this hydraulic press cycles steam and cold water.

At Acton Rubber Company, two vital pieces of processing equipment use Aeroquip Hose of Teflon —Acton's hydraulic press and calendar rolls. Steam pressure reaches 125-150 psi. And the calendar rolls cycle steam and cold water.

The switch to Aeroquip Hose of Teflon and reusable "*super gem*" Fittings began more than 2 years ago when troublesome, costly failures of the original hose on the hydraulic press started piling up. Aeroquip Hose was selected as the replacement because the Teflon lining won't break down under temperature extremes. And the strong stainless steel outer braiding will never kink or corrode. This two year old replacement hose line is still giving trouble-free service.

Acton's master mechanic plans to replace all hose lines with Aeroquip Hose of Teflon, as the ordinary hose fails. He's found that he makes important savings on material and labor as well as solving a major maintenance problem, by avoiding costly machine downtime.

Your Aeroquip Distributor can do as much for you. He's listed in the "Yellow Pages" under "Hose." Call him to learn about the complete Aeroquip line of hose and reusable fittings.

Ask your Aeroquip Distributor or write for a copy of this guide to selecting the proper hose to use with 112 common fluids.

Aeroquip

AEROQUIP CORPORATION • JACKSON, MICHIGAN
INDUSTRIAL DIVISION

Circle 633 on postcard, page 33

To the Executive Concerned With Improved Profits

Every winter a profit-reducing menace stalks your plant— stop it now!

The menace is dry air whenever the heat is on in your plant. You and your production people are probably well aware of the troubles it causes.

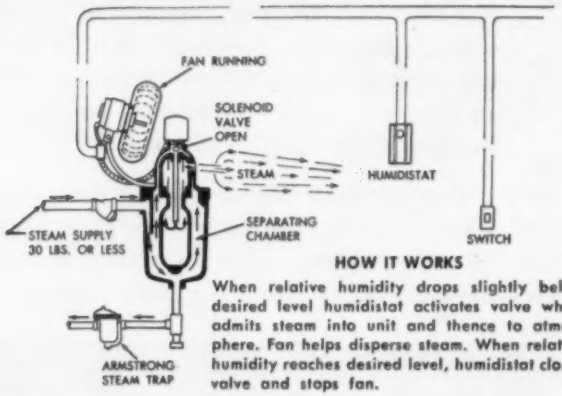
But, have you ever calculated the annual cost of losses that result from the effects of dry air on hygroscopic materials such as wood, leather or paper . . . or the losses in production efficiency caused by static electricity . . . or the reduction of human efficiency in dry air?

It can be staggering.

There is a bright spot, though. The cost of correcting dry air conditions may be a lot less than you think, if you humidify your plant with Armstrong Steam Humidifiers.

It costs you nothing to find out. Just say the word and we will have your nearby Armstrong Representative make a humidification survey of your plant. There's no obligation, and you find out just what it does cost to get guaranteed humidification.

THE ARMSTRONG STEAM HUMIDIFIER—EFFECTIVE, ECONOMICAL



HOW IT WORKS

When relative humidity drops slightly below desired level humidistat activates valve which admits steam into unit and thence to atmosphere. Fan helps disperse steam. When relative humidity reaches desired level, humidistat closes valve and stops fan.

ARMSTRONG STEAM HUMIDIFIERS

Manufactured and Guaranteed by the Makers of Armstrong Steam Traps

ARMSTRONG MACHINE WORKS

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Circle 634 on postcard, page 33

DUST CONTROL

Dust Control Benefits—Information on how dust control raises employee morale, efficiency. Pangborn Corp.
Circle 243 on Post Card

Safe, Easy Dust Control—Catalog 155B tells how to handle tough dust control jobs safely. The Spencer Turbine Co.
Circle 244 on Post Card

For Cleaner Stacks—Information on custom-engineered dust control systems. Dracco Div., Fuller Co.
Circle 245 on Post Card

CONSTRUCTION

Build Big, Save Big—Facts on quality prefab building. Butler Mfg. Co.
Circle 246 on Post Card

Building Style at a Saving—Data on versatile aluminum V-beam sheet. Alcoa.
Circle 247 on Post Card

Light Tailored to Needs—Catalog describes light-diffusing Coolite translucent glass. Mississippi Glass Co.
Circle 248 on Post Card

Using Divider Panels?—Names of panel fabricators utilizing Hetron polyester plastic. Durez Plastics Div.
Circle 249 on Post Card

Who Makes Panels?—Names of manufacturers using Paraplex P-444 acrylic-polyester resin for weather-resisting reinforced panels. Rohm & Haas Co.
Circle 250 on Post Card

Safety Grating—Catalog describes Grip-Strut open steel grating that's fire-, slip-proof. The Globe Co.
Circle 251 on Post Card

Falls Can Be Expensive—Reasons for installing Multigrip steel floor plate. United States Steel Corp.
Circle 252 on Post Card

Safety Underfoot—Bulletin AL-84 describes abrasive rolled steel floor plates. Alan Wood Steel Co.
Circle 253 on Post Card

Low-Cost Insulated Doors—Information on Prest-O-Matic light cooler door. Clark Door Co., Inc.
Circle 254 on Post Card

Economical Concrete Inserts—Facts on wide selection of types, sizes. Grinnell Co., Inc.
Circle 255 on Post Card

MATERIALS HANDLING

How to Choose a Crane—Engineering and Data Booklet 2008 aids in planning, selecting cranes. The Cleveland Crane & Engineering Co.
Circle 256 on Post Card

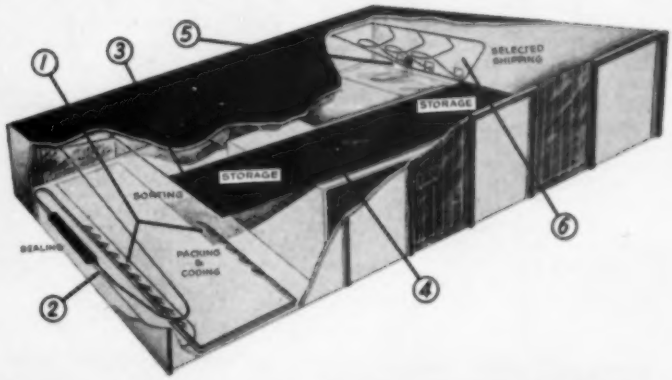
Pallet Loaders, Conveyors—Bulletin APL-60 describes conveyor engineering service. Mathews Conveyer Co.
Circle 257 on Post Card

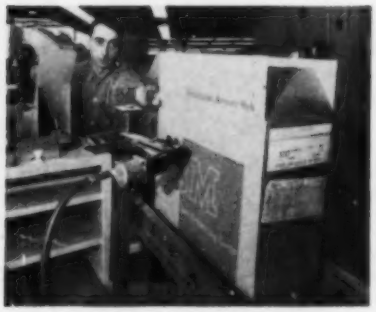
REPORT ON

CUTTING COSTS WITH CONVEYORS

How a Standard Conveyor custom-engineered system at IBM provides · simple electronic sorting · space-saving gravity storage · push-button order filling · one-man operation

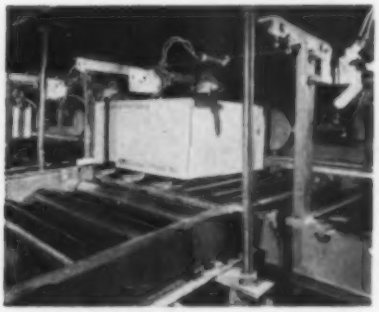
IBM's punched card plant at Concord, Mass. turns out hundreds of millions of cards per year for its New England customers. The mere physical handling of this massive volume is a problem in itself—and it becomes even trickier because each order is unique, usable only by one customer. Complicating the problem, each carton of 10,000 cards is outwardly identical, except for the shipping label. Here's how Standard Conveyor's *System Specialists* helped IBM work out a simple mechanized system to solve the intricate sorting and storing problem.



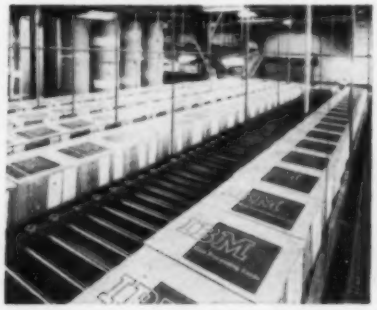


1 At card manufacturing machine station, each full carton is automatically coded by a brass staple as it enters conveyor system. Staple position determines to which storage line carton will go. Staple does not penetrate inside of carton.

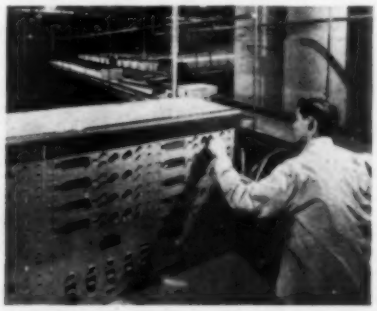
2 Boxes from various stations, representing different customer orders, are intermixed on main conveyor line. After being closed and sealed they are turned on their sides before being routed to sorting and storage conveyors.



3 On sorting conveyor, position of coding staple, now on top, is sensed by electrical brass-fingered reader. If reader contacts staple, a retractable stop pops up and air actuated ram pushes carton into correct storage line.



4 Six of the 16 ceiling-hung storage lines as seen from the sorting area. Each customer order is now in one line and may consist of any number of cartons.



5 Shipping clerk at order filling console knows from his shipping card where orders are stored, how many cartons each order contains, and which carrier gets which order. When truck arrives, clerk selects order desired—rest is automatic.

6 Cartons enter shipping room from storage lines at left. Shipping clerk also operates electrical diverters from console to route each order into one of four chutes. Thus, one man controls the entire sorting and storing system.

Standard Conveyor COMPANY

305-L Second St., North St. Paul 9, Minn.

Specialists in the System Concept of Conveying. Fully staffed with professional personnel who are ready to help you envisage, engineer and execute a master plan to cut material handling costs. Sales engineering offices in more than 50 cities . . . consult your telephone book Yellow Pages under "Conveyors".

Circle 635 on postcard, page 33

Move More Material—Brochure 70 describes custom-engineered conveyors. Conveyor Systems, Inc.

Circle 258 on Post Card

Lower Overhead Conveying Costs—Catalog 220 describes economical, custom-designed systems. The Colorado Fuel & Iron Corp.

Circle 259 on Post Card

Compact Hoist—Bulletin 920-PE describes how hoist hugs beam to save valuable overhead space. Robbins & Myers, Inc.

Circle 260 on Post Card

Less Headroom Needed—Information on Lo-Hed hoists. Aircraft Armaments, Inc.

Circle 261 on Post Card

For Dependable Lifting—Catalog describes chain and wire rope hoists. Chisholm-Moore Hoist Div.

Circle 262 on Post Card

Custom-Built Hoists—Facts on crane engineering. Wright Hoist Div.

Circle 263 on Post Card

Coil Handling Economy—Motorized coil lifters are discussed in Bulletin SL-32. Cullen-Friestedt Co.

Circle 264 on Post Card

What Kind of Sling?—Bulletins 5308-R, 5886 give selection data on slings. Macwhyte Wire Rope Co.

Circle 265 on Post Card

Floor Savers—Handbook gives facts on easy-rolling casters, wheels. Darnell Corp., Ltd.

Circle 266 on Post Card

Dumping Hopper—Details on a hopper that automatically dumps, rights and locks. Roura Iron Works, Inc.

Circle 267 on Post Card

WATER TREATING

Water Conditioning Aids—Details on services to prevent cooling tower deterioration. Betz Laboratories, Inc.

Circle 268 on Post Card

Scale Problems?—Brochure covers consulting service on water use and disposal. Hall Laboratories.

Circle 269 on Post Card

PACKINGS

Lattice Braid—Economical Teflon pump packing is described in Bulletin AD-185. Garlock, Inc.

Circle 270 on Post Card

Controlled Density Gaskets—Catalog AD-176 tells how they offer unusual sealing. Garlock, Inc.

Circle 271 on Post Card

MAINTENANCE

Color Survey Service—"Quick Reference Guide" plus "How to Reduce Painting Costs." Barreled Sunlight Paint Co.

Circle 272 on Post Card

Epoxy Coatings—Literature tells how Adheron cuts maintenance cost. Hauger-Beegle Associates, Inc.

Circle 273 on Post Card

Heat-Proof Coating—Information and sample of coating that stands the torch test. Markal Co.

Circle 274 on Post Card

Practical Vacuum Units—Folder tells how they save on maintenance, other operations. Invincible Vacuum Cleaner Mfg. Co.

Circle 275 on Post Card

Brushes for All Uses—Facts on brushes for all types of industrial needs. Newark Brush Co.

Circle 276 on Post Card

Safety at All Levels—Catalog shows safety-step ladders with retractable casters. Ballymore Co.

Circle 277 on Post Card

MECHANICAL POWER TRANSMISSION

Coupling with Long Life—Bulletin 4100 describes coupling with grid-groove design. The Falk Corp.

Circle 278 on Post Card

Why Bearings Fail—Facts on consultation available for bearing problems, selection, maintenance. SKF.

Circle 279 on Post Card

VALVES, TRAPS

Butterfly Valves—Bulletin 590X describes advantages of these resilient seated valves. W. S. Rockwell Co.

Circle 280 on Post Card

Stainless Steel Ball Valves—Circular 612 describes valves for corrosive service. The Lunkenheimer Co.

Circle 281 on Post Card

Pinch Valves, Systems—Massco-Grigsby pinch valves are covered in Catalog 609. Mine and Smelter Supply Co.

Circle 282 on Post Card

Efficient Trap—Bulletin T1743 tells advantages of Yarway Impulse steam trap. Yarnall-Waring Co.

Circle 283 on Post Card

SAFETY, SECURITY

Danger Warnings—Catalog shows electrical, other accident-prevention signs. Stonehouse Signs, Inc.

Circle 284 on Post Card

Chain Link Fencing—Booklet "What Makes Page Fence the Right Fence For You." Page Fence Assn.

Circle 285 on Post Card

STORAGE

Shelving Planned Professionally—Information on engineered-answers for problems. Deluxe Metal Products Co.

Circle 286 on Post Card

Assemble-Fast Shelving—Catalog describes steel shelving with clip and stud. Lyon Metal Products, Inc.

Circle 287 on Post Card

OTHER EQUIPMENT

Measuring Instruments—Bulletins on gages. Uehling Instrument Co.

Circle 288 on Post Card

Equipment Guides—Bulletins cover water-operated sump pump, gas scrubber, condenser, gear pump. Schutte & Koerting Co.

Circle 289 on Post Card

Cooling Equipment—Bulletin DFC-61 covers DriCooler closed circuit fluid cooler. The Marley Co.

Circle 290 on Post Card

After Coolers—Bulletin 130 covers thrifty Aero units for compressed air, gases. Niagara Blower Co.

Circle 291 on Post Card

Packaged Air Preheater—Booklet describes Ljungstrom preassembled unit. The Air Preheater Corp.

Circle 292 on Post Card

Trouble-Free Burners—Data on ready-to-install Hev-E-Duty oil, gas burners. Industrial Combustion, Inc.

Circle 293 on Post Card

Air Line Filter—Staynew filters for trouble-free operation are covered in Bulletin 200. Dollinger Corp.

Circle 294 on Post Card

Which Chain?—Catalog 1050 helps choose the right one. Link-Belt Co.

Circle 295 on Post Card

Laminate Without Sticking—Literature on heat-resistant Release roller cover. Stowe-Woodward Inc.

Circle 296 on Post Card

Product Finishing Systems—Catalog A661 describes units for quality finishes. The R. C. Mahon Co.

Circle 297 on Post Card

Elevator Economics—Facts on how professional maintenance reduces shutdown costs. Otis Elevator Co.

Circle 298 on Post Card

Quickly-Installed Liners—Design data on liner plates. Armco Drainage & Metal Products, Inc.

Circle 299 on Post Card

USE THESE IDEAS...

TO GET UP TO AN EXTRA 4% NET PROFIT

Out of the Texaco man's briefcase comes a wealth of ideas for cost control through organized lubrication—Texaco's "Stop Loss" Program. Managers in many industries are already using these plans to reduce losses in three important areas: production, maintenance and purchasing. Their savings go directly into profits—the average is a 4% gain in their net. Get the facts. Write for our informative folder: "How to Starve a Scrap Pile." **TEXACO** INC., 135 East 42nd Street, New York 17, N. Y. Dept. E-192

TEXACO

PLAN SHELVING PROFESSIONALLY WITH DELUXE

Get answers that are **engineered** (without charge) to solve your storage problems today—and tomorrow! Select from a versatile and almost limitless choice of shelf units, bins, drawers, doors and dividers. Add the long experience and creative ingenuity of DeLuxe to make them most effective. One example: by stacking our shelving three tiers high, **we recently saved one company 20,000 feet of floor space.** Money-saving solutions like this cause more and more companies to call DeLuxe before they make a move. Only DeLuxe has unique boltless construction (goes up in minutes). DeLuxe has more information, more possibilities, more answers. **Like to see a professional solution to your storage problem before you spend a penny?** Call or write: DeLuxe Metal Products Company, Division of Royal Metal Manufacturing Company, Dept. **21-K,** One Park Avenue, New York 16, N. Y. SHOWROOMS: New York, Chicago, Los Angeles, San Francisco, Seattle, Atlanta; Galt, Ontario.

DELUXE

Circle 686 on postcard, page 33

BULLETINS

(Begins on page 31)

Sliding Gate Control Valves
Features of sliding gate diaphragm control valves are illustrated with cutaway diagrams in 8-pp Catalog DCV-1. Includes pressure and temperature ratings, capacity charts, dimensions, flow chart, diagrams of various hook-ups, and sample specifications. Jordan Valve, Div., Richards Industries, Inc.
For a copy, circle 145 on Post Card

Improved Ball Valves
In addition to illustrating features of Econ-o-miser ball valves, this brochure contains tables and data for quick selection of size, metal combinations, seals, seats, pipe ends. Cost comparison between standard ball valve, gate valve and Econ-o-miser included. Worcester Valve Co., Inc.
For a copy, circle 146 on Post Card

Three-Way High Vacuum Valve
Details on a three-way valve that offers minimum restriction to gas flow and replaces roughing, foreline and conventional high vacuum valves are described in 8-pp Booklet 328. Mechanical specifications, installation, operation, maintenance, and parts replacement and accessories covered. Central Scientific Co.
For a copy, circle 147 on Post Card

Steam Heating Specialties
Illustrated and described in 8-pp Bulletin Form 1501D are radiator valves, inverted bucket traps, radiator traps, high pressure thermostatic traps, float and thermostatic traps, strainers and gages. Capacities, dimensions, weights tabulated. Dunham-Bush, Inc.
For a copy, circle 148 on Post Card

Quick Connect/Disconnect Couplings
Bulletins 240-61 and 250-61 contain specifications and details on popular models of quick connect/disconnect couplings—the E design for high pressure, gravity flow and vacuum systems, and the H model primarily for hydraulic lines. The brochures also show methods for using couplings. Snap-Tite, Inc.
For a copy, circle 149 on Post Card

WATER TREATING

Boiler Feedwater Treatment
Essentials of boiler feedwater treatment are discussed in 24-pp Bulletin 30. Explains why water treatment is needed, and describes such methods as coagulation and precipitation, ion exchange process. Nalco Chemical Co.
For a copy, circle 150 on Post Card

Treatment for Wide pH Range
This 12-pp guide to Ionac C-240, sulfonated polystyrene cation exchanger for water treatment, sets forth in text, charts and tables their chemical properties, operating characteristics. Also gives data on sodium and hydrogen cycles. Ionac Chemical Corp.
For a copy, circle 151 on Post Card

Fully-Automatic Gravity Filter
Bulletin WC-130, 6 pp, contains flow diagrams and dimensions of Monovalve, a gravity filter with a single control valve. Describes construction, operation and applications. Graver Water Conditioning Co.
For a copy, circle 152 on Post Card

Dispersives for Minimizing Sludge
Custom-engineered dispersives formulated to minimize adherent sludge formation in boilers and recirculating cooling systems are described in Bulletin HSP-941. Selection of dispersives and case histories dealing with accumulation problems are discussed. Hagan Chemicals & Controls, Inc.
For a copy, circle 153 on Post Card

PUMPS

Split-Case Centrifugal Pumps
Features and advantages of single-stage, double suction horizontal split-case centrifugal pumps are detailed in 8-pp Bulletin 105C. Includes sectional photos, selection charts, dimensional data, limitations chart. Aurora Pump Div., The New York Air Brake Co.
For a copy, circle 154 on Post Card

High-Vacuum Booster Pumps
Rotary positive, two-impeller, dry type compressors for high vacuum systems for environmental applications and processing are illustrated and described in Bulletin HV-161. Includes typical pumping speed curves, compression ratio vs inlet pressure curves. Roots-Connersville Blower Div., Dresser Industries, Inc.
For a copy, circle 155 on Post Card

Two-Stage Centrifugal Pumps
Detailed information on horizontally split-case centrifugal pumps is presented in 8-pp Bulletin 722.6. Includes performance curves, material specifications, interchangeability charts and dimensions. Goulds Pumps, Inc.
For a copy, circle 156 on Post Card

PACKINGS, SEALS

Mechanical Seal Assembly
Described in Bulletin 492 is a mechanical seal assembly designed to serve high pressure conditions. Lists applications in chemical, petro-chemical, petroleum-refining and pipe line industries. Durametallic Corp.
For a copy, circle 157 on Post Card

Sealing Components
Colorful 16-pp Catalog 359B shows high pressure seals and fasteners, transparent, flexible seals, and other products. Dimensional drawings, specifications, technical and ordering data given. A. P. M. Corp.
For a copy, circle 158 on Post Card

Lattice Braid Packings
Characteristics and advantages of braided packings are detailed in 8-pp Form AD-131. Recommendations for a variety of services are given along with lengths, weights. Garlock Inc.
For a copy, circle 159 on Post Card

SITE LOCATION

Florida Plant Locations
Industrial development opportunities in Florida, and services available in evaluating manpower, markets, power and water, transportation and ports, natural resources and raw materials, taxes and state regulations, as well as analytical studies for plant sites covered in 14-pp brochure. Florida Development Commission.
For a copy, circle 160 on Post Card

New York Location Service
This 8-pp folder presents scope and character of consulting services available to firms contemplating new industrial locations. Factors in plant site selection are covered, such as raw materials, transportation, markets, labor etc., and requirements for securing needed information on each are listed. New York State Department of Commerce.
For a copy, circle 161 on Post Card

INSTRUMENTS, CONTROLS

Remote Control Design Manual
Bulletin 618, 28 pp, is a guide to design, selection and installation of remote control systems for valves and equipment actuated by rotating shafts. Divided into three sections, covers flexible shaft controls, rigid rod controls and gear boxes, with diagrams and specification charts. Selection information on components for an installation. Stow Mfg. Co. Inc.
For a copy, circle 162 on Post Card

Liquid Level Alarms
Bulletin EX-700 contains information on liquid level alarms that turn on a built-in signal light and sound an alarm when liquid reaches predetermined level. King Engineering Corp.
For a copy, circle 163 on Post Card

Postage-free Reader Service Cards for your convenience in ordering these bulletins are provided on pages 33-34. You may also use the post cards for ordering literature mentioned in the ads.

Thermocouple Assemblies, Parts
Detailed specifications and price lists for general purpose and special-use thermocouple assemblies and components are included in 40-pp Catalog G100-1. Complete selection and application information given. Minneapolis-Honeywell Regulator Co.
For a copy, circle 164 on Post Card

Portable Leak Detectors
Featured in 8-pp Bulletin GEA-6817A are portable, halogen sensitive, electronic leak detectors for protection against leaks in pressure or vacuum systems. Tells how to select proper percent of tracer gas and test pressure. General Electric Co.
For a copy, circle 165 on Post Card

Electrical Tachometer System
Complete tachometer system, including transmitter, receiver and drives,

BULLETINS

(Begins on page 31)

and enclosures for wall mounting and waterproof models, are described in Bulletin 720, 10 pp. Applications and dimensions are illustrated and general specifications listed. Herman H. Sticht Co., Inc.

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Feedpump Recirculation Control
Advantages of feedpump recirculation control from temperature difference, and the two basic systems evolved—on-off and proportional control—are described in Bulletin MSA-196, 8 pp. Diagrams show system functions. Hagan Chemicals & Controls, Inc.

For a copy, circle 167 on Post Card

Automatic Data Loggers
Flexibility and economy of Data-Master automatic data loggers are described in 6-pp Bulletin D401. Photographs show operating system installations; typical log sheets are illustrated. The Bristol Co.

For a copy, circle 168 on Post Card

Production Control System
Details on the 3100 data accumulation and monitoring system are presented in Bulletin CPB-152. System performs seven basic functions—times, displays, accumulates, pages, informs, communicates and controls. General Electric Co.

For a copy, circle 169 on Post Card

TOOLS

Shop Tools and Accessories
Although intended for metal shop instructors, this 30-pp ordering guide contains helpful selection information on a variety of lathes, detailing their safety and service features. Also cataloged are vertical spindle milling machines, drill presses, bench shapers, grinders, attachments and accessories. South Bend Lathe, Inc.

For a copy, circle 170 on Post Card

Grinding Wheel Chart
"Do's and Don'ts" in use and handling of grinding wheels are set forth on this handy wall chart. Printed on hard stock, chart is issued in the interest of safety while using grinding wheels. Grinding Wheel Institute.

For a copy, circle 171 on Post Card

Pipe, Tools, All Kinds
Hand tools for pipe, tubing and conduit are illustrated in a 16-pp catalog. Technical data includes cutter wheel reference chart, tables of solid and adjustable pipe and bolt dies, and prices. Reed Mfg. Co.

For a copy, circle 172 on Post Card

MATERIALS HANDLING

Money Saving Conveyor Ideas
Brochure Conveyorama presents new ways to cut costs with conveyors, with demonstration photos of a low-accumulation-pressure live roller; clamp type carton stackers, high speed vertical lifts, and others. Standard Conveyor Co.

For a copy, circle 173 on Post Card

Conveyors and Systems
Portable conveyors, steel belt conveyors and custom conveyors from off-the-shelf components are illustrated and described in 8-pp Catalog MF-100A. Specifications are included as well as data on hinged-steel belting. May-Fran Mfg. Co.

For a copy, circle 174 on Post Card

Conveyor Systems, Controls
Eight-page Bulletin 61-1 presents a comprehensive coverage of systems controls and components for conveyor installations, with photos and drawings showing actual application of various units. Control Engineering Co.

For a copy, circle 175 on Post Card

Materials Handling Systems
Six-pp Bulletin FL-661 describes materials handling systems, special products and services, including systems for unloading, feeding operations, conveying and elevating, parts and package handling, processing and equipment for bulk materials handling. Webster Mfg. Inc.

For a copy, circle 176 on Post Card

Conveyor Belt Engineering
Information required for horsepower calculation and a condensed horsepower formula are included in 28-pp Bulletin 175. Data on speed and idler factors, horsepower required to overcome pulley friction, estimated average belt weights, determining horsepower for acceleration, maximum allowable working tension, belting, takeup included. Hewitt-Robins.

For a copy, circle 177 on Post Card

Conveyor Belting Maintenance
This wall chart points out ways to reduce conveyor belting wear through proper maintenance procedures. Gives brief description and recommendations of belting for specific applications in mining, metal processing, utilities, food processing, materials handling, chemical processing, pulp and paper industries. Hewitt-Robins.

For a copy, circle 178 on Post Card

Pneumatic Conveyors for Plastics
Diagrammed in Bulletin P-1-P are pneumatic conveyor systems for handling plastic pellets at both producing and finishing plants. Systems can be provided for conveying at rates from 2000 to 100,000 lb per hour. National Conveyors Co., Inc.

For a copy, circle 179 on Post Card

Heavy Duty Fork Lift Trucks
Factors in selecting heavy duty fork lift trucks are detailed in this 24-pp catalog. Illustrates and describes eight new models in load capacities from 10,000 to 24,000 lb, powered by gasoline, LP-gas, or diesel engines. Towmotor Corp.

For a copy, circle 180 on Post Card

Automated Materials Handling
Profits to be realized from automation of materials handling and the equipment available for this are detailed in Brochure 614. Case histories emphasize economies possible with an automated system and typical Guide-O-Matic layouts are included. Barrett-Cravens Co.

For a copy, circle 181 on Post Card

Hydraulic Lifting Devices
Automated oil hydraulic equipment for raising and lowering applications is featured in 6-pp Catalog 861-1. Autoquip Corp.

For a copy, circle 182 on Post Card

High Speed Electric Hoist
Design and operation features of Frame I electric hoists for capacities from 1000 to 6000 lb are detailed in 8-pp Catalog DH-173. Specifications and clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

For a copy, circle 183 on Post Card

MECHANICAL POWER TRANSMISSION

Adjustable-Speed Drives
Product description and application, factors in drive selection, and recommendations for special use are covered in 32-pp Bulletin GEA-6999. Includes price-comparison table, and describes operation principle, drive components, control functions, and functional requirements of drive. General Electric Co.

For a copy, circle 184 on Post Card

Convertible Speed Reducer
Presented in Bulletin 602A is a small shaft-mounted speed reducer designed for use on 1¼ and smaller diameter shafts. Includes engineering drawings, dimensions, weights, recommended V-belt and horsepower ratings. Dodge Mfg. Corp.

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Stepless Speed Changer
Described in Bulletin 51B9061B and 51B1042 are speed changers designed to provide low cost variable speed, with mechanical, electrical and pneumatic control options. Covers five sizes providing stepless speed changes within standard speed ranges of 2 to 1 through 10 to 1 at 1.8 to 4660 rpm. Allis-Chalmers Mfg. Co.

For a copy, circle 186 on Post Card

OTHER EQUIPMENT

Vertical-Unit Boiler
The Modular VU-60 boiler is described in 6-pp bulletin, showing design highlights, characteristics curve and temperature traverse. Combustion Engineering Inc.

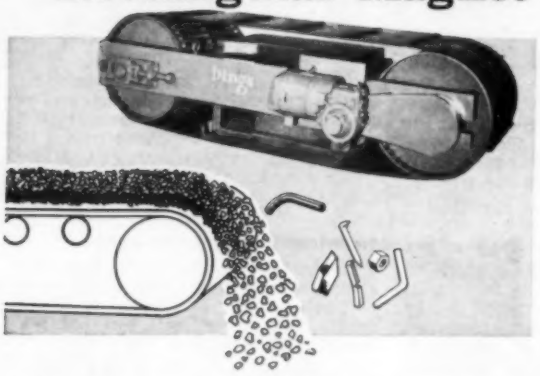
For a copy, circle 187 on Post Card

Steel Equipment Selection Manual
Reference Manual 488 contains 64 pp of selection data on steel storage equipment and related products, covers, shelving of all types, parts bins, tool room equipment, benches and cabinets, sorting and filing equipment, modular counters, lockers, floor grating, and slotted angle for custom shelf fabrication. Equipto.

For a copy, circle 188 on Post Card

HOW TO DO IT BETTER MAGNETICALLY

Self-Cleaning Rectangular Magnet



Attracts Iron Through Deep Burdens

DINGS Rectangular Magnet protects machinery and production by pulling tramp iron out of deepest fast moving burdens. Endless belt makes discharge automatic and constant. No manual labor required for cleaning. If power fails, iron will not drop on belt. In-line or cross belt models available.

Write for Bulletin 1315-A.

Magnetic Sheet Floater

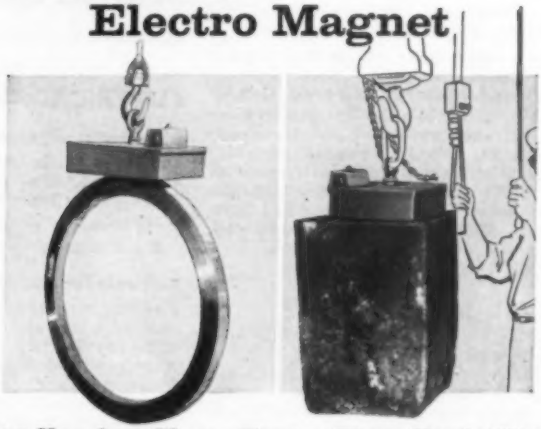
Reduce Sheet Handling Costs

With Dings Sheet Floater, there is no need to fumble with thin oily sheets. Top sheets are clearly separated from those below. The strength of the permanently energized magnet is guaranteed for the mechanical life of the unit.

Write Dings for details on how you can increase press output, protect dies, protect painted and finished surfaces . . . save labor and cut costs.

Write for Bulletin 1208-B.

Low Cost Electro Magnet

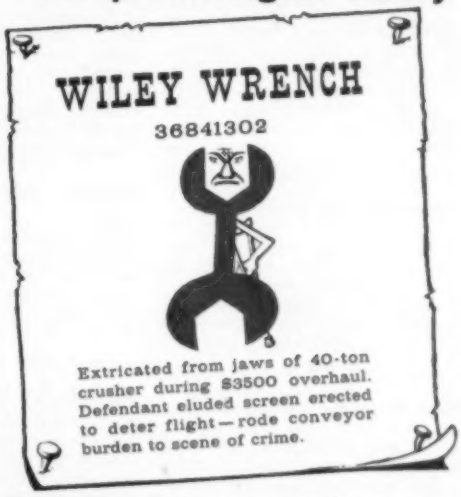


Handles Any Shape Faster Than Hook Sling

DINGS Magna-Hoist is a low cost electro magnet that will handle all kinds of back-breaking metal lifting jobs around the plant no matter how irregular the shape. It is more flexible, more *available* than a lift truck and easier, faster to use than a hook sling. You just hang it on any hoist. Magna-Hoist measures only 8" x 15" x 3".

Write for Bulletin B-1403-B.

Tramp Iron Rogues Gallery


WILEY WRENCH
36841302
Extricated from jaws of 40-ton crusher during $3500 overhaul. Defendant eluded screen erected to deter flight—rode conveyor burden to scene of crime.

STOP TRAMP IRON DAMAGE BEFORE IT COSTS YOU MONEY!

PE-361

DINGS MAGNETIC SEPARATOR CO.
4760 West Electric Avenue
Milwaukee 46, Wisconsin

LET Dings DO IT

Circle 636 on postcard, page 33

BULLETINS

(Begins on page 31)

Involute Cyclone Collector
Operation of involute cyclone collectors for control and collection of industrial dust is outlined in Bulletin 180. Illustrates typical installation, explains operation. John Wood Co.

For a copy, circle 189 on Post Card

Temperature-Rated Infrared Ovens
Catalog BRG-115, 16 pp, covers electric infrared ovens for industrial applications, showing temperature-rating method for automatically providing right oven for a specific application. Some 540 vertical and 144 horizontal standard models are listed, with specifications. Radcor, Inc.

For a copy, circle 190 on Post Card

Plate-Fin Heat Exchangers
Details on heat transfer equipment engineered to meet specific requirements of a process or industry are given in Product Bulletin 701. Plate-fin heat exchanger is illustrated. John J. Nesbitt, Inc.

For a copy, circle 191 on Post Card

Security Services Guide
Management-oriented analysis of advantages to be gained through outcontracted security services is presented in this 16-pp booklet. Covers uniformed guard and protection, internal surveys, applicant background investigations, external surveillance, warning sign service, personal protection. Pinkerton's National Detective Agency, Inc.

For a copy, circle 192 on Post Card

Electric Furnace Exhaust Hood
How to control electric furnace fumes is explained in 6-pp Bulletin 924. Includes detailed photos and sketches of the exhaust hood as well as the cloth bag dust collector. Pangborn Corp.

For a copy, circle 193 on Post Card

Handy Mathematical Handbook
This 64-pp pocket-sized handbook on formulas and arithmetical rules contains power and roots, logarithms, decimal equivalents, circular arc tables, mensuration formula etc. Also included are business formulas such as profit and loss. The Curta Co.

For a copy, circle 194 on Post Card

Economical Gasoline Electric Set
Features of a 20-35 kw Sure Power electric set are highlighted in 6-pp Bulletin BU-752. Describes gasoline engine, also a-c brushless generator used. Specifications of basic set are given, important components illustrated. Typical applications shown. Allis-Chalmers Mfg. Co.

For a copy, circle 195 on Post Card

Vibratory Finishing Units
Air-cushioned vibratory finishing equipment is illustrated in 12-pp Bulletin 1703, picturing typical parts before and after finishing. Cutaway drawings show features of machines and how they work. Pangborn Corp.

For a copy, circle 196 on Post Card

DATA FILE OF LITERATURE FOR THE PLANT ENGINEER'S LIBRARY

STANDARD CATALOGS, bulletins and handbooks are described here to help plant engineers maintain a permanent data file. To order this free literature, use Reader Service Cards provided for you on pages 33-34.

ELECTRICAL

Distribution Transformers
Dry type distribution transformers, single and three phase, are featured in 16-pp Bulletin 5A2-BL01. Wiring diagrams provided. Acme Electric Co.

For a copy, circle 301 on Post Card

Controls for Heavy Duty Applications
Publication 6090 is a 20-pp guide to control units and stations for standard, heavy duty and oiltight heavy duty applications. Design features are illustrated and described, and applications, ratings, enclosures, modifications covered. Allen-Bradley Co.

For a copy, circle 302 on Post Card

Electrical Control Equipment
Eighty-pp Bulletin LO-11 features safety switches, service controls, load centers and accessories for electrical control equipment. Design and construction features, selection tables, case dimensions, and wire tables are included. Cutler-Hammer Inc.

For a copy, circle 303 on Post Card

Enclosed Switches
Catalog 83, 22 pp, Catalog 84, 16 pp, and Catalog 101, 24 pp, cover enclosed switches, including general types for a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, others. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

For a copy, circle 304 on Post Card

Magnetic Starters
Eight-pp Bulletin PL 12-8-160 features low-maintenance CY magnetic starters with step-by-step photos showing easy parts replacement. Sizes and models are pictured, and arc quenching principle covered in detail. The Clark Controller Co.

For a copy, circle 305 on Post Card

Panelboard Information
Tumbler switch and plug fuse panelboards are featured in Bulletin 307. Table of catalog numbers, ratings and sizes included, also typical wiring diagram, operating information and specifications. Frank Adam Electric Co.

For a copy, circle 306 on Post Card

Electrical Equipment Digest
Presented in 168-pp Catalog Digest 143 are load centers, circuit breakers, low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters. Square D Co.

For a copy, circle 307 on Post Card

Basic Electrical Protection
Form BPB, 10 pp, gives information on interrupting capacity, speed of response, current limitation, motor protection, system selectivity to faults, fuse applications and selection. Bussmann Mfg. Co.

For a copy, circle 308 on Post Card

Electrical Testing Instruments
Twelve-pp Bulletin 19-60 describes electrical resistance testers, dielectric test sets, cable fault locating equipment, turn ratio test sets, others. James G. Biddle Co.

For a copy, circle 309 on Post Card

Measurements on Insulated Cables
Corona-level measurements on rubber and thermoplastic insulated power cables is described in 12-pp Bulletin RCT 711, covering detectors, equipment installation and operation, testing technique etc. Photos and drawings illustrate schematics, models and a typical installation. Rome Cable Div., Alcoa.

For a copy, circle 310 on Post Card

Data on Sheathed Cables
Construction details and performance information on sheathed cables, available in steel, copper, aluminum and bronze, are presented in Bulletin 1031, 16 pp. Engineering data included. Simplex Wire & Cable Co.

For a copy, circle 311 on Post Card

Safety Mineral Insulated Cable
Bulletin S-2-60, 20-pp, describes properties, applications, installation, construction and performance characteristics, and wiring specifications of mineral insulated cable for hazardous locations. Mineral Insulated Wire Div., General Cable Corp.

For a copy, circle 312 on Post Card

Rubber Power Cable
This 32-pp catalog contains information on design features, insulations and performance highlights of butyl rubber power cable. Includes data on available constructions, ampacity etc. Anaconda Wire & Cable Co.

For a copy, circle 313 on Post Card

Flexible, Portable Cords and Cables
Catalog 5-54, 40 pp, features flexible and portable cords, including lamp, heater, rubber jacket, Neoprene jacket cords, power, thermostat cables and wires. Royal Electric Corp.

For a copy, circle 314 on Post Card

Cable Support Equipment
Described in 28-pp Catalog 5912 are two types of cable trays or tube race-

ONE OF A SERIES OF CHATS ABOUT THE CONSERVATION AND CONTROL OF HEAT

SARCO TOPICS

WHY THE BIG STRAIN?

It's tough to keep gases and liquids "clean" as they run through a pipe. They drag impurities along, which can make even plain water a trouble maker, let alone more sophisticated fluids. That's because water, as a liquid or steam, is intimately involved with vital equipment like steam traps, temperature regulators, or tools. Meters, burners, nozzles, and pumps, too.

By this time you must realize we're going to talk strainers, don't you? A good, stout subject, of interest to all who feel production belongs up and costs belong down. Sarco makes strainers for water and condensate, steam, oil, air, gas and other piped fluids . . . dozens of different sizes and types and ratings of strainers to match every application need. Even our line of plain and simple strainers is built for super service. These are pipeline strainers, types AT, BT, and CT, which are designed for 250, 250 and 600 psi non shock, respectively, and 475°, 450° and 750°F. temperature ratings. Standard screens are heavy-gauge, perforated brass or stainless steel. Sarco specializes in screens that can withstand abnormal pressure differentials created by accumulated sediment.

Next, Sarco's flanged strainers, type D. These come in larger sizes, right up to 12", and are available in standard or extra heavy types.

And finally, *Sarco scraper strainers*, manual or motorized. These are the really eye-popping models, and if you can't use one yourself — well — you'll just have to get your kicks elsewhere.

Examples? Take Inland Steel Company at East Chicago, which gets water from Lake Michigan to cool its large air conditioner condensers. The water used to pass through traveling screens, but still contained fine sand. Clogging!

Heat under collars! Frequent cleaning required! Sometimes practically no air conditioning on hot days. (Isn't that always the way?)

The Inland Steel people installed Sarco Rotary Scraper Strainers, Type VRS, which incorporate a hand-operated helical scraper knife within the cylindrical strainer screen. A few turns of the crank at regular intervals, and the sand is scraped off the screen, blown clear, and discharged at pressure through a manual valve to waste. Dismantle the strainer? Shut down the unit? Not *this* strainer!

Now, as long as we've come this far, it's only a hop and a skip to the Firestone Tire and Rubber Co. in Akron, Ohio, who also use water in tremendous quantities. They circulate it through tire presses and a cooling tower, and there's no nonsense about it. It *has* to be clean or damage to equipment could be downright catastrophic. When the plant

modernized and enlarged, Firestone replaced their 4" Sarco hand-operated scraper strainer, type VRS, with a larger Sarco 8" model. And while they were about it, they got the motor-operated type, for continuous cleaning.

When we say that companies like these want the insurance of a Sarco strainer, it sounds like advertisingese, but sometimes there just isn't any other way to put it. Sarco strainers *are* insurance at low cost on the operation of your high cost equipment. So when we ask if you have lumps in your pumps, or worries over your slurries, we're *serious*. We've heard everything in the straining line, so why not write us for literature and answers to those special problems you have.

A T-44 IS THE BEST POLICY

Sorry, but we can't leave the subject of insurance without bringing to your attention one of the best little insurance policies any company requiring cooling control could invest in. It's the *self-powered* Sarco T-44 Automatic Cooling Control. No compressed air or electricity is needed, but its advantages are best described in terms of three different plants of just one Sarco customer — Revere Copper and Brass, Inc.

Revere-Baltimore, Md., has cut water use 40 to 50% with T-44's. But in addition to former water waste, Revere had even more problems: possible wet air from uncontrolled cooling of compressor aftercoolers, plus sweating compressor cylinders; variations in viscosity of hydraulic oil and bearing oil; gas generator water waste; unreliability of manual shut-off of water supply when machines were down.

If your ears perk up in sympathy at mention of any of these problems, the results of Revere's cooling control program should bring you to full attention. One large compressor that had gulped 2400 gallons per hour now takes only 420 gallon sips. In addition all the problems itemized above were solved. T-44's are now used on their air compressors, gas generators, and hydraulic oil systems. At Revere-Riverside, Cal., water savings of 50% were experienced, and at Revere-Rome, N. Y., substantial savings were made too.

But after all, wasting water is only one way of wasting money, so let's go on to another matter of interest: the evils of manual control. When cooling water is controlled by hand the temptation to leave the valve nearly wide open is almost overpowering, in order to play it safe if the load varies. Result: overcooling, of course. And varying the flow runs the risk of undercooling. In either case, lowered process efficiency. Answer: The automatic Sarco T-44, which can't be tempted, is meticulously honest, unsentimental, and plain inhumanly practical when it comes to cooling control. You really ought to write for literature. T-44 is your best policy.

SPARE PARTS INSURANCE

As long as we're near the end, and still on this subject of insurance, may we graciously leave you with this valuable tip? No matter how closely a steam trap approaches perfection, some gremlin may cause it to act up. It's conceivable. So, keep on hand a parts list and spares of key parts for your steam traps and other system components. Parts are small and worth their weight in gold when you need them. A Sarco field engineer will make up a suggested list for you, if you tell us what components make up your system.

Might as well even keep a disc or two on hand for your Sarco Thermo-Dynamic Steam Traps, Type TD-50, even though they're so trouble-free our salesmen keep complaining about the lack of replacement parts business. We'll be glad to tell you about this unique steam trap in case you still don't know how miraculously simple and effective it is.

Pardon our monopolizing the conversation in this series of paid communiques, but we're trying our best to interest you in certain subjects that concern us both — to the point where you'll communicate.

5903

SARCO

SARCO COMPANY, INC.
635 MADISON AVENUE, NEW YORK 22, N. Y.
PLANT: BETHLEHEM, PA.

STEAM TRAPS • TEMPERATURE CONTROLLERS
STRAINERS • HEATING SPECIALTIES

Pipeline Strainer
Circle 683 on postcard, page 33

T-44 Cooling Control
Circle 684 on postcard, page 33

Steam Trap, Type TD-50
Circle 685 on postcard, page 33

DATA FILE

(Begins on page 226)

ways—the ladder type and the basket small opening type—for cable, wiring and tubing support. Includes dimensions. The Globe Co.

For a copy, circle 315 on Post Card

Corrosion-Resistant Wiring Devices

Bulletin H-1997, 10 pp, presents complete line of rugged wiring devices that resist corrosive effects of moisture, grease, oil and most acids. Harvey Hubbell, Inc.

For a copy, circle 316 on Post Card

Condulets for Corrosive Locations

Sixteen-pp Bulletin 2699 discusses corrosion-resistant properties of metals and finishes utilized. Charts show applications. Also provides listings of Plast-A-Coat Condulets for hazardous and non-hazardous locations. Crouse-Hinds Co.

For a copy, circle 317 on Post Card

Inverted-Y Electrification

Aluminum inverted-Y conductor systems discussed in Form 2025A, 8 pp, are available for 500-1200 amp, continuous rating, 600-v for wall and ceiling mounting in dry places. The Cleveland Crane & Engineering Co.

For a copy, circle 318 on Post Card

Industrial Truck Batteries

Construction features and advantages of industrial truck batteries with silconic plate for longer battery life are detailed in 24-pp Bulletin GB-1567D. Includes curves showing discharge characteristics of battery typs. Gould-National Batteries, Inc.

For a copy, circle 319 on Post Card

Industrial Truck Batteries

A three dimensional die-cut in the center of 12-pp Bulletin IT-531 shows industrial truck battery construction. Mechanical and electrical specifications given. C & D Batteries Div.

For a copy, circle 320 on Post Card

Charger Efficiencies Charted

Section 57.10 illustrates the efficiencies of Exide "UR" chargers, with one chart showing models and a-c input voltage and efficiency at indicated loads, and another showing charger currents in amperes. The Electric Storage Battery Co.

For a copy, circle 321 on Post Card

DUST, FUME CONTROL

Dust Control with Automation

Form FM60, 4 pp, describes features and advantages of automatic dust collector, with a cutaway view showing operation and construction detail. Torit Mfg. Co.

For a copy, circle 322 on Post Card

Dust Control Systems

Bulletin 104, 36 pp, on dust filters, gives information on dust control systems and how to engineer them. Describes the Roll-Clean Dynaclone dust filter. The W. W. Sly Mfg. Co.

For a copy, circle 323 on Post Card

Glass-Bag Filters

Features and advantages of glass-bag filters for cleaning hot, corrosive gases are described in 12-pp Bulletin 806. Installations are illustrated and methods of cleaning bags covered. Dracco Div., Fuller Co.

For a copy, circle 324 on Post Card

Dust Collection, Recovery

Product data on dust collection, precipitation and gas scrubbing equipment covers electrical precipitators, mechanical dust collectors, others. Western Precipitation Corp.

For a copy, circle 325 on Post Card

CONSTRUCTION

Steel for Structures, Equipment

"New Concepts in Steel Design and Engineering," 59 pp, describes and compares types that make up the modern family of constructional steels. Illustrations of actual designs and concepts show how these steels can be used. U. S. Steel Corp.

For a copy, circle 326 on Post Card

Sectional Plate

Advantages and design principle of AmBridge sectional plate, for use as piping, pipe arches, arches, and underpasses, are described in Bulletin AB21010, 31 pp. Specifications, diagrams, erection procedures and the Talbot Formula for determining the opening of a culvert are included. American Bridge Div., U. S. Steel.

For a copy, circle 327 on Post Card

For Industrial, Service Applications

Described in 18-pp Bulletin LP-5960 are underpasses, tunnels, and conduits designed for safe pedestrian transport, industrial conveyance and service applications. Describes sizes, shapes available and includes tables of data on liner plate. Armco Drainage & Metal Products, Inc.

For a copy, circle 328 on Post Card

Structural Clay Products

Descriptive information and construction details on structural clay building materials are given in 24-pp Catalog S-61. Characteristics and advantages of facing tile, bricks, other products, are detailed. Natco Corp.

For a copy, circle 329 on Post Card

Concrete Admixtures

This 32-pp bulletin is a guide to concrete admixtures, iron-armoured floor products, grouting and waterproofing materials and other products for improving concrete and mortar. Contains guide specifications. The Master Builders Co.

For a copy, circle 330 on Post Card

Built-Up Roofing Specifications

General requirements for built-up roofing are covered in this 28-pp 1961 manual, with roof selector guide and application information. Covers steep deck and dead level roofs, spray pond roofs, promenade tile roofs, roofing over existing roofs, insulation. The Philip Carey Mfg. Co.

For a copy, circle 331 on Post Card

For Fire-Retardant Ceilings

Advantages and applications of fire-retardant ceilings are detailed in 8-pp bulletin. Armstrong Cork Co.

For a copy, circle 332 on Post Card

Rolling Steel Doors

Details on rolling steel doors, grilles and shutters are presented in 16-pp Catalog G-61. Includes specifications, installation diagrams, tables of clearances. The R. C. Mahon Co.

For a copy, circle 333 on Post Card

Cold Storage Doors

Power operated and manual cold storage doors are illustrated and described in Catalog 261. Construction explained. Clark Door Co., Inc.

For a copy, circle 334 on Post Card

High Velocity Closure

Illustrated Bulletin A1-61 describes the Air Isolator, an air curtain closure that opens doors to unlimited traffic, screens out heat, cold, humidity, dust, odors and insects. Selection table included. Jamison Cold Storage Door Co.

For a copy, circle 335 on Post Card

Acrylic Plastic Sheet

Properties and characteristics of Plexiglas acrylic plastic sheet are detailed in 12-pp Booklet PL-415. Applications shown. Rohm & Haas Co.

For a copy, circle 336 on Post Card

Glass for Industrial Use

Rolled, figured and wired glass for installation in industrial buildings is described in 12-pp Catalog 61-1. Contains photos of individual patterns accompanied by light distribution charts and data. Mississippi Glass Co.

For a copy, circle 337 on Post Card

Any of these bulletins, catalogs and technical booklets can be yours without cost or obligation. Use the Reader Service Cards on page 34.

Non-Slip Steel Flooring

Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of 8-pp Booklet AL-29. Alan Wood Steel Co.

For a copy, circle 338 on Post Card

Safety Floor Plate

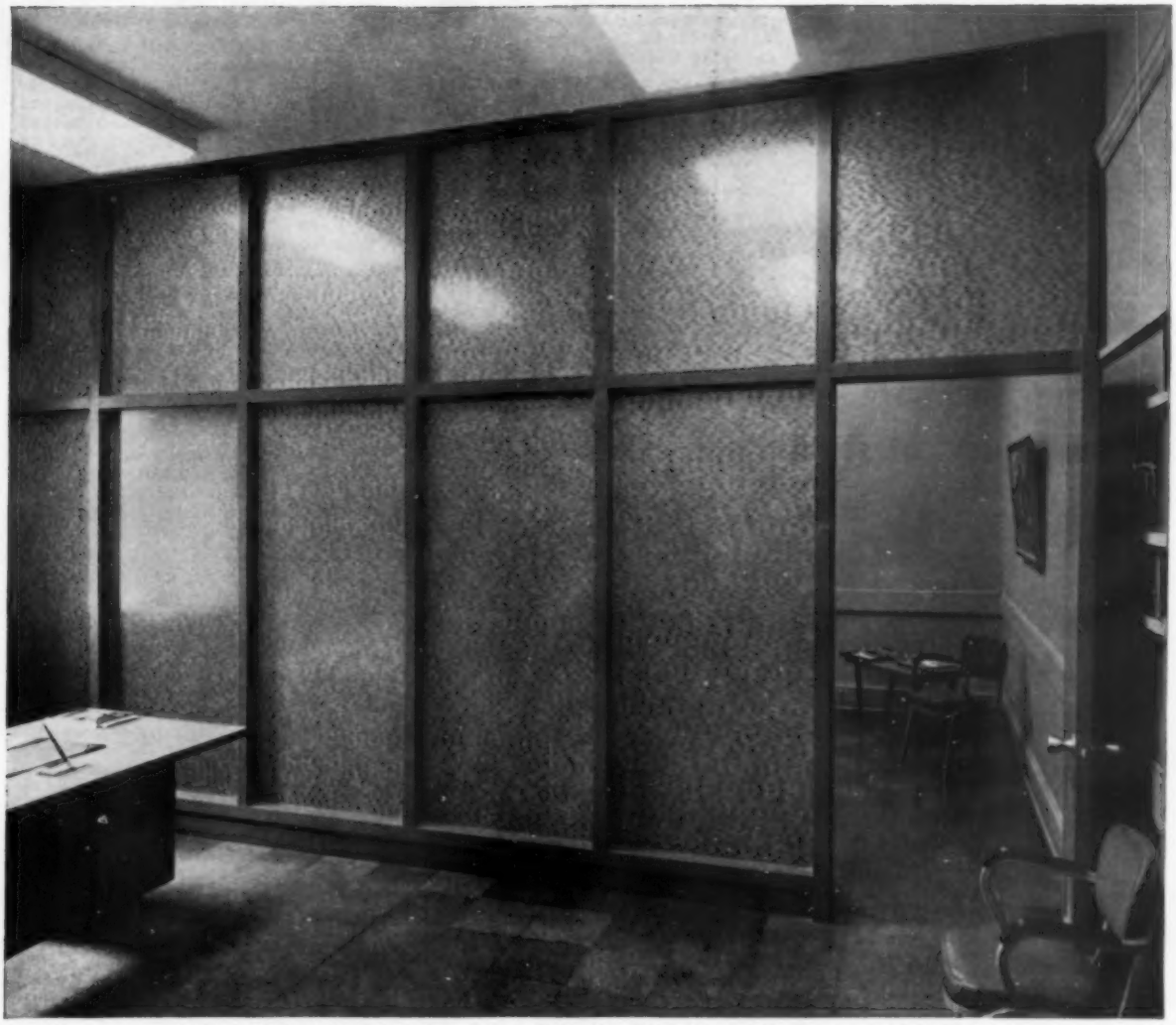
Advantages of Multigrip floor plate designed for sure footing and positive traction are detailed in Bulletin ADUCO-17002. Tables list sizes, weights and loads. U. S. Steel Corp.

For a copy, circle 339 on Post Card

Aluminum Welded Sash

Illustrated and described in this product sheet is rigid welded sash made from aluminum extrusions. Advantages listed. Butler Mfg. Co.

For a copy, circle 340 on Post Card



Oakland Auditorium, Oakland, California. Interior by Division of Architecture, City of Oakland Department of Public Works.

Looking for something new in panels?

YOU'VE FOUND IT. These translucent divider panels have textiles, weaves, wood, and even metal molded right into them. They give you almost unlimited choice of decorative design and color.

You can get them for exteriors or interiors. They're light in weight, rugged, and won't shatter because they are made of plastic and fibrous glass. They're resistant to solvents, easy to install and maintain.

The panels softly diffuse natural and artificial light. Choice of designs transmitting from 17% to 87% of natural or artificial light, as well as choice of thickness, helps you solve lighting and thermal control problems.

SELF-EXTINGUISHING FOR CODES. This paneling comes in a special grade that doesn't support combustion.

It's designed to meet safety codes for offices, schools, plants, hospitals. Made with Hetron®, the flame-retardant polyester plastic.

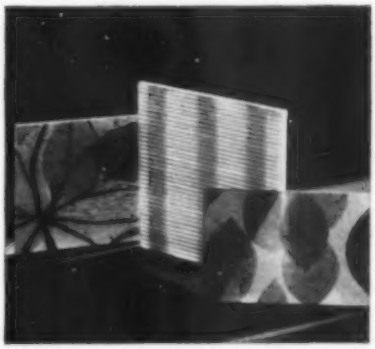
Panels containing this plastic are different. Even if flame gets a foothold, it doesn't spread.

That's why, when codes say "fire-retardant material," it's a good idea to write "Hetron" in your panel specification.

Then you're sure.

You can get a wide choice of daylighting and interior panels, corrugated or flat, made with this self-extinguishing plastic by leading fabricators in this country and Canada.

Write, and we'll be glad to tell you who they are.



Attractive, sturdy—and safe—paneling shown above incorporates many designs. It is made with Hetron fire-retardant plastic by Panelcraft Company, San Francisco.

DUREZ PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION, 3911 WALCK ROAD, NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS

Circle 638 on postcard, page 33

DATA FILE

(Begins on page 226)

Aluminum Stair Treads, Grating

Details on aluminum stair treads and grating featuring one-piece construction are presented in Bulletin AD-679. Types of finishes, sizes and weights available are listed. Aluminum Co. of America.

For a copy, circle 341 on Post Card

Screw Fastening of Aluminum

This 48-pp technical handbook covers standard and special fasteners and fastening systems used to join aluminum assemblies. Includes list of manufacturers of screw fasteners. Reynolds Metals Co.

For a copy, circle 342 on Post Card

STORAGE, SHOP EQUIPMENT

Economical, Creative Steel Framing

How-to-do-it-yourself ideas and applications for storage racks, shipping containers, tables, platforms etc. of AIM slotted angle are described in 24-pp Brochure AD-410. Over 30 installation photos show design versatility and strength, and a 7-pp section shows pre-designed ready-to-assemble kits available. Acme Steel Co.

For a copy, circle 343 on Post Card

Shelving and Equipment Guide

To assist plant engineers in selecting proper shelving for all storage requirements, 64-pp Catalog 30 offers suggestions for correct shelving and storing materials, loose and packed parts. Instructions for planning a stockroom included. Royal Metal Mfg. Co.

For a copy, circle 344 on Post Card

Steel Equipment Selection

Catalog 100 K contains 100-pp of detailed information on steel cabinets, folding chairs, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, bins. Lyon Metal Products, Inc.

For a copy, circle 345 on Post Card

Steel Shelving and Equipment

Illustrated in 8-pp Form 2715 is quick-erection, adjustable steel shelving for maximum space savings, as well as tool stands, benches, cabinets. Standard Pressed Steel Co.

For a copy, circle 346 on Post Card

VALVES, TRAPS, PIPING AND FITTINGS

Stainless Steel Valves

Catalog 59SS, 32 pp, on stainless steel valves, illustrates design and construction features. Details advantages in withstanding corrosive atmospheres. Jenkins Bros.

For a copy, circle 347 on Post Card

Improved Butterfly Valves

Resilient-seated butterfly valves for applications where positive tight closure counts are illustrated in Bulletin 590X. W. S. Rockwell Co.

For a copy, circle 348 on Post Card

Pinch Valves

Construction features of Massco-Grigsby pinch valves are explained and illustrated in 14-pp Catalog 609. Provides sleeve service recommendations and specifications for manual, motorized, hydraulic types. Mine and Smelter Supply Co.

For a copy, circle 349 on Post Card

Globe and Angle Valves

Described in Form 188 are full-flow bronze globe and angle valves featuring full area seat opening and accurate throttling control. Tables of dimensions. The Wm. Powell Co.

For a copy, circle 350 on Post Card

Non-Lubricated Plug Valves

Features and advantages of non-lubricated plug valves designed to provide tight-resilient seal and give maximum resistance are detailed in Bulletin AE-1061. W-K-M Div., ACF Industries.

For a copy, circle 351 on Post Card

For Heat, Process Applications

Bulletin 561-C describes a diaphragm operated pressure reducing valve for steam heat and process steam applications. Design advantages are detailed. Leslie Co.

For a copy, circle 352 on Post Card

AMCA
Certified Ratings

YOUR ASSURANCE
OF PROPERLY RATED PERFORMANCE
IN AIR MOVING DEVICES

The AMCA program of Certified Ratings provides assurance of properly rated performance to specifiers and users of centrifugal fans, axial and propeller fans, power roof ventilators and other air-moving devices. To qualify for license under the Certified Ratings Program, manufacturers must meet the following basic requirements:

A manufacturer must publish performance ratings developed in accordance with AMCA's Standard Test Code, and based on tests conducted in laboratories approved by AMCA.

These published performance ratings must be developed for various volumes, pressures and speeds—at a stated density...

...and are subject to periodic re-evaluation under AMCA's continuing retest program. Authority to use the Certified Ratings Seal may be withdrawn by AMCA for non-conformance with any requirement of the Program.

When you see the Certified Ratings Seal on a manufacturer's published performance data or product, you are assured that the air-moving devices you specify have been properly rated, and meet all requirements of the Air Moving and Conditioning Association's Certified Ratings Program. For additional information, mail coupon below.

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AMCA Certified Ratings for Air Moving Devices

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Circle 639 on postcard, page 33

FOAMGLAS-BOARD®:

the benefits of FOAMGLAS in large board size

The proven insulation benefits of FOAMGLAS are available now in a special 2′ x 4′ unit, a board size that speeds roofing installation and cuts labor costs.

The qualities of FOAMGLAS—moistureproof, vaporproof, strong, rigid, dimensionally stable, incombustible—are retained in this new package that makes it faster and easier to handle on the job. Multiple sections of 1½″ FOAMGLAS are sandwiched between a special asphalt-laminated paper. The units are bundled for shipment, eliminating messy cartons and wrappings at the job-site.

New FOAMGLAS-BOARD reduces the number of roofing insulation joints, and is easily cut and shaped on the job to provide a tight fit around drains, vents or other obstructions.

For more information on FOAMGLAS-BOARD send for a free copy of our catalog: Pittsburgh Corning Corporation, Department PE-111, One Gateway Center, Pittsburgh 22, Pennsylvania. In Canada: 3333 Cavendish Boulevard, Montreal, Quebec.

PITTSBURGH

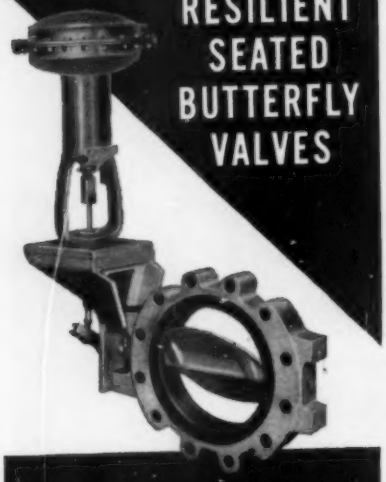
PC

CORNING

Circle 640 on postcard, page 33

ROCKWELL

RESILIENT SEATED BUTTERFLY VALVES



SAVE

SPACE

Face-to-face width is less than one-third the pipe size.

WEIGHT

60 to 80% less than that of gate valves, depending on size.

COST

Less than other types in original outlay and maintenance.

TROUBLE

Shut-off is leak-tight against pressure or vacuum. Seat liner renewable.

Available with manual or automatic control for full range of pressures and other flow conditions.

- LOW PRESSURE DROP
- NO FOULING
- SELF-CLEANING
- SIMPLE CONTROL

Write for Bulletin 590X.

W. S. ROCKWELL COMPANY
2920 Eliot St. • Fairfield, Conn.

Made and sold in Europe by
COCKBURNS, Ltd., Glasgow S.W.2, Scotland

Circle 641 on postcard, page 33

DATA FILE

(Begins on page 226)

Bronze Ball Valves

Circular 611 describes bronze ball valves, including complete operational information, cutaway views, ratings, design features and dimensions. The Lunkenheimer Co.

For a copy, circle 353 on Post Card

Valves with Straight-Through Flow

Advantages and features of Straightway diaphragm valves are described in this folder, with simplicity of design and maintenance illustrated and sizes given. Grinnell Co., Inc.

For a copy, circle 354 on Post Card

Valve Actuating Unit

Catalog V-200 describes the Valvmatic, a unit designed for converting hand-operated valves to automatic operation. C. H. Wheeler Mfg. Co.

For a copy, circle 355 on Post Card

Trap Strainer Applications

Bulletin 601, 8 pp, gives case histories of trap strainer applications. Covers size, straining media, materials of construction, housing, screens. Multi-Metal Wire Cloth Co., Inc.

For a copy, circle 356 on Post Card

Manual on Steam Traps

Catalog K, 48 pp, on steam traps provides information on open flat and thermostatic types, pipe strainers. Discusses fundamentals of steam trapping, selection, installation; includes steam pipe sizing tables. Armstrong Machine Works.

For a copy, circle 357 on Post Card

Steam Traps, Regulators

This 12-pp condensed catalog contains technical and capacity data on steam traps, temperature regulators and heating specialties. Cutaway views included. Sarco Co., Inc.

For a copy, circle 358 on Post Card

Transite Pressure Pipe Guide

Twenty-four-pp Bulletin TR-62A contains detailed information on handling and installation of Transite pipe, from loading and unloading to backfilling and tamping. Johns-Manville Corp.

For a copy, circle 359 on Post Card

Pipe Dimensions Charted

This chart shows OD and wall thickness for ⅛- through 42-in. pipe. Includes information from ASA Standard B36.10 showing IPS and schedule number and their relationship. Midwest Piping Div., Crane Co.

For a copy, circle 360 on Post Card

How to Make Ends Meet

Catalog-Manual 60, 34 pp, presents a simple and efficient method of installing pipe. Coupling fittings and tools utilized are detailed. Shows how method is adaptable to various pipe. Victaulic Co. of America.

For a copy, circle 361 on Post Card

Warn...or inform them of

NO Admittance

with Stonehouse Signs

Stonehouse NO ADMITTANCE Signs play an important part in your safety program to warn workers of dangerous areas...inform visitors where to go.

All Stonehouse Signs are designed and manufactured to accomplish this purpose in the most effective manner. They are of the highest quality workmanship and materials and comply fully with American Standard Specifications.

Hundreds of different stock-worded accident-prevention signs are available for prompt shipment. Usually the same day your order is received.

Signs Since 1863

Write today for our free, full-color, 64-page catalog, plus information about custom-printed signs to meet your specifications.

Stonehouse SIGNS

STONEHOUSE SIGNS, INC.
9th and Larimer Streets, Denver 4, Colorado

Circle 642 on postcard, page 33

Expansion Joints

Twelve-pp Bulletin EJ-1917 describes advantages of Gun-Pakt expansion joints with either welding or flanged ends. Sections on figuring expansion of pipe line, expansion joint installation. Yarnall-Waring Co.

For a copy, circle 362 on Post Card

Unions, Valves, Fittings

Ring-bound Catalog U-601 provides detailed literature on unions, valves and fittings of forged steel. Lists popular unions with their technical ratings. Clayton Mark & Co.

For a copy, circle 363 on Post Card

Quick-Connective Couplings

Catalog 100 contains data sheets detailing quick-connective fluid-line couplings for pneumatic, hydraulic, oxygen, acetylene, steam gases and liquids. The Hansen Mfg. Co.

For a copy, circle 364 on Post Card

LIGHTING

Lamp Selection Data

Incandescent and fluorescent lamps are described in Form 2B with selection tables, electrical details and price list. Champion Lamp Works.

For a copy, circle 365 on Post Card

Lighting Selector

This 24-pp lamp and lighting guide for plant and office lighting, tabulates recommended illumination levels, and tells how to obtain them with fluorescent, mercury or filament lamps. Graybar Electric Co., Inc.

For a copy, circle 366 on Post Card

Emergency Lighting Systems

Detailed information on automatic emergency lighting systems and accessories is presented in 24-pp Publication 252. Describes features of nickel-cadmium battery and includes capacities and ratings, time-load requirement chart, wiring diagrams. The Standard Electric Time Co.

For a copy, circle 367 on Post Card

TOOLS, WELDING AND MACHINE SHOP

Pipe Tool Guide

Application data on Ridgid pipe tools is provided in 16-pp Catalog 7596R-6. Wrenches, cutters, threaders, reamers, vises and others are illustrated. The Ridge Tool Co.

For a copy, circle 368 on Post Card

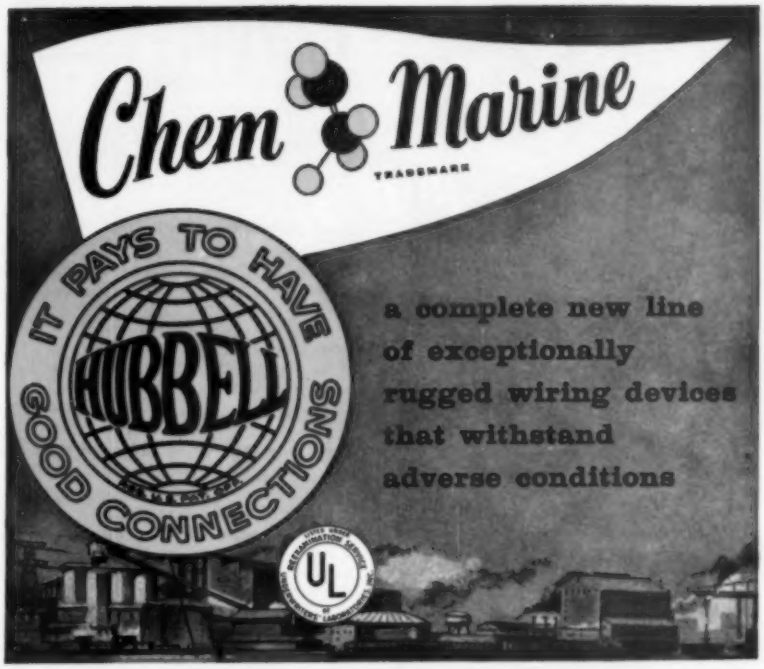
Carbide-Tipped Bits for Masonry

Catalog MBC-56 describes masonry bits for drilling tile, brick, concrete, granite etc. Specifications are included and chuck, shank requirements given. New England Carbide Tool Co., Inc.

For a copy, circle 369 on Post Card

Industrial Power Tools

Data on power tools for construction, production and maintenance are presented in 38-pp Form 85. Covers drills, hole saws, magnetic drill presses, screwdrivers and accessories, impact wrenches, belt sanders, grinders,



RESISTS CORROSION

This new super line of "Chem Marine" devices are engineered from corrosion resistant materials capable of withstanding the harmful effects of moisture, brine, grease, oils and many acids. They are designed for industrial applications such as plating rooms, shipping platforms, yards, shops, warehouses, or wherever corrosion or chemical action is a problem.

Special Materials:

"INSULPRENE"—a Du Pont neoprene compound.

"MONEL® METAL"—Reg. Trademark of INCO.

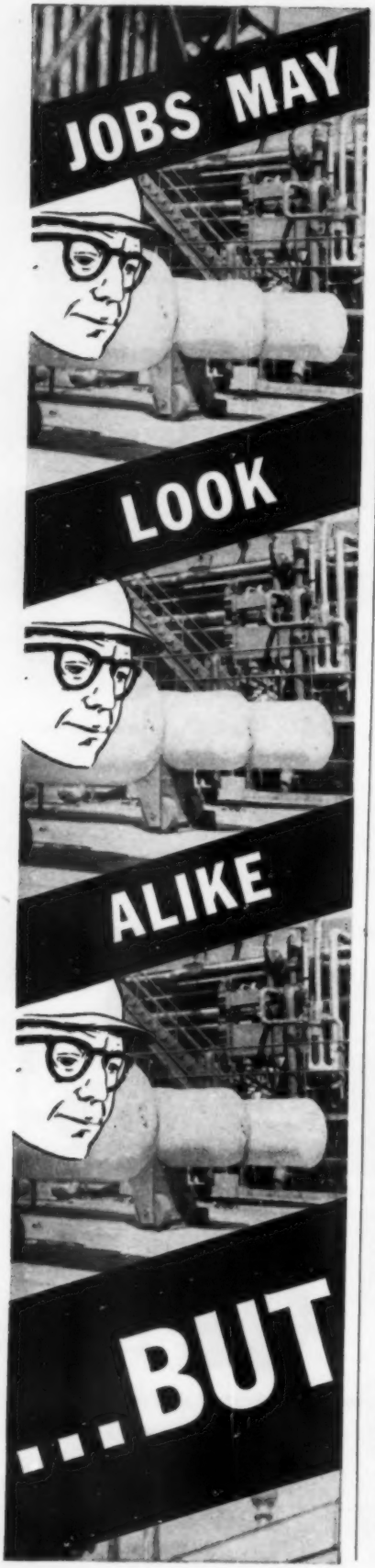
"MELAMINE"
"CYMEL®"—Reg. Trademark of Am. Cyanamid

HEAVY NICKEL-PLATED CURRENT CARRYING PARTS.

"Chem Marine" devices are identified by their bright yellow color and a few representative items are illustrated above. For complete information contact the "Chem Marine" Department.—

HARVEY HUBBELL, INCORPORATED
BRIDGEPORT 2, CONNECTICUT,

Circle 643 on postcard, page 33



DATA FILE

(Begins on page 226)

grinding wheels, saw blades. The Black & Decker Mfg. Co.

For a copy, circle 370 on Post Card

Tool Selection Made Easy

Detailed selection data on holders, set-up and hold-down tools, tool bits, machine shop specialties, wrenches, socket wrenches, sets containing wrenches and detachable sockets, miscellaneous hand tools and pipe tools are in 132-pp Catalog 700. Armstrong Bros. Tool Co.

For a copy, circle 371 on Post Card

Do's and Don'ts of Concrete Sawing

This brochure on concrete sawing helps reduce cost and increase life of a saw rig, and diamond and abrasive blades. Included are equipment and blade selection, operation, maintenance, and good sawing techniques. Clipper Mfg. Co.

For a copy, circle 372 on Post Card

For Welding Flux Recovery

This bulletin tells how company's equipment salvages unused flux from submerged arc welding, removes powder and returns slag-free, dust-free flux to welder in a continuous flow. Dimensions and specifications for stationary, portable models. Invincible Vacuum Cleaner Mfg. Co.

For a copy, circle 373 on Post Card

Welding Wire Applications

Submerged arc and inert gas welding wires are discussed in Bulletin DH-402-C. Stainless steel, low alloy and mild carbon steel automatic welding wire applications described. Page Steel & Wire Div., American Chain & Cable Co., Inc.

For a copy, circle 374 on Post Card

Disposable Wipers

Applications of disposable wipers for general purpose wiping, cleaning and polishing are illustrated and described in 12-pp product bulletin. Kimberly-Clark Corp.

For a copy, circle 375 on Post Card

For Positive Vibration Control

Wedgemounts for bolting machinery to the floor, and Jacmounts for mounting machinery, to assure positive dampening of vibration, shock and noise are described in two circulars with selection aids, specifications, photos and cutaway drawings included. Air-Loc Div., Clark-Cutler-McDermott Co.

For a copy, circle 376 on Post Card

WATER CONDITIONING

Consulting Service

Advantages of company's consulting service in solving problems of scale and corrosion control in boilers, cooling systems, and process waters are detailed in Bulletin 5006-A. Dearborn Chemical Co.

For a copy, circle 377 on Post Card

Industrial Water Service

Discussed in this 22-pp bulletin is the range of industrial water problems—from pre-treatment to waste disposal—and need for proper water management to obtain lowest water costs. Hall Laboratories, Div. Hagan Chemicals & Controls, Inc.

For a copy, circle 378 on Post Card

Problems of Water Processing

Bulletin A-1, 8 pp, discusses chemistry of coagulation, practical approaches to problems and solutions of water processing, applications of sodium aluminates, refined montmorillonites, cationic, anionic and nonionic polymers. Nalco Chemical Co.

For a copy, circle 379 on Post Card

For Corrosion Control

Pretreatment designed to promote rapid film formation as protection against cooling water corrosion is described in this data sheet. Advantages of pretreatment for all-steel and cooling water systems are detailed. Betz Laboratories, Inc.

For a copy, circle 380 on Post Card

Continuous On-Stream Analysis

Details on the Chemonitor, for on-stream analysis of critical constituents in water, 16-pp brochure. Hagan Chemicals & Controls, Inc.

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HEATING, VENTILATING

Heaters For Industrial Applications

Detailed information on electric heaters is given in 20-pp Bulletin EC-261-R. Illustrates suspension or portable and duct heaters, natural and radiant convection heaters, infra-red heaters. Electromode Div.

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Unit Heaters—Repair or Replace?

A common-sense approach to unit heater maintenance, Bulletin 158-B helps decide whether to repair or replace unit heaters that have failed, covering causes of failure, leaks that signal failure, and how to make decisions based on cost economics. Modine Mfg. Co.

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Gas-Fired Unit Heaters

Operating principles, selection factors, applications and specifications for propeller, duct, blower and heavy-duty type heaters are outlined in 16-pp Bulletin JS-151P, Janitrol Heating and Air Conditioning Div.

For a copy, circle 384 on Post Card

Heater Test Code

Presented in 22-pp Bulletin 20 is a revised code for testing propeller-type steam unit heaters. Establishes uniform methods for tests on heaters using dry steam as heating medium and serves as a standard for developing performance ratings. Air Moving & Conditioning Ass'n, Inc.

For a copy, circle 385 on Post Card

"101 Ways to Apply Electric Heat"

Industrial heating applications and methods are described in this 32-pp

booklet. Illustrated case histories show use of metal-sheathed electric heating units. Installation details given. Edwin L. Wiegand Co.

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Comfort Curtain Heating, Ventilating

This 8-pp colorful bulletin describes the "comfort curtain" principle of heating and ventilating. Advantages are detailed. Lennox Industries Inc.

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Efficient Roof Ventilators

Engineering data on roof ventilators, fans and blowers—including the Vertiget, automatic Airjet, reversible, mushroom head and stack cap types—is presented in 16-pp Bulletin A-112E. Hartzell Propeller Fan Co.

For a copy, circle 388 on Post Card

Direct Connected Fans

Bulletin 690-A, 12 pp, gives dimensions, application and performance data on fans for general and system ventilation and power roof ventilators. Robbins & Myers, Inc.

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Power Roof Ventilators

Detailed specification data on direct-driven low silhouette type propeller roof ventilators for exhaust and supply ventilation is presented in 8-pp Bulletin DB3-100. Covers features. Hg Electric Ventilating Co.

For a copy, circle 390 on Post Card

Make-Up Air Solutions

Bulletin EN-5911 explains how air properly introduced eliminates problems arising when fans draw fumes, smoke or odors. Reznor Mfg. Co.

For a copy, circle 391 on Post Card

Air Engineering Data File

Bulletin E-57. 24 pp, covers engineering and test facilities for propeller fans, specifications, construction, maintenance and installation with tables for estimating air-handling. Aerovent Fan Co., Inc.

For a copy, circle 392 on Post Card

Air Handling Equipment

Product Bulletin B-5216 describing air handling, air cleaning, air conditioning and mechanical draft equipment, including heating and ventilating equipment, industrial process and mechanical draft apparatus, others. Westinghouse Electric Corp.

For a copy, circle 393 on Post Card

Air Moving Equipment

Bulletin DB-45, 20 pp, contains data on roof ventilators, bifurcators, axial flow vent sets, and air jets with ratings. DeBothezat Fans Div., American Machine and Metals, Inc.

For a copy, circle 394 on Post Card

High-Pressure Blowers

Types CB and R pressure blowers designed for high pressure and moderate volume in 135 to 37,500 cfm capacities are described in Bulletin FI-310, 14 pp. Selection chart and dimension table help in choosing correct unit. Buffalo Forge Co.

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In fact, it can make the difference between minimum fire damage and extended production down-time on valuable processing equipment and buildings.

As the pioneer in thermal-insulation protection, Foster has the industry's longest and deepest experience in designing systems to resist virtually all combinations of abuses — weather, fire, corrosive atmospheres, physical wear-and-tear. And . . .

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Circle 644 on postcard, page 33

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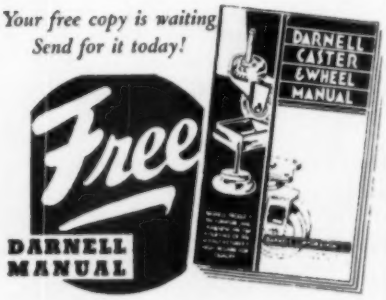

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Circle 645 on postcard, page 33

DATA FILE

(Begins on page 226)

Steam Jet Blowers, Nozzles

Operation and performance of steam jet blowers using pressure steam or compressed air for ventilating and circulating applications, and blast nozzles designed for low drafts in ducts and stacks is described in Bulletin 4 AB. 8-pp. Dimensions weights given. Schutte and Koerting Co.

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LUBRICATION

Organized Lubrication Benefits

Major cost control factors of organized lubrication are told in this 24-pp bulletin. Covers cost control opportunities, responsibilities. Texaco, Inc.

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Lubricating Manual

Function and properties of lubricants and selection of lubricants for lubricated plug valves are covered in this 12-pp manual. Walworth Co.

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Heavy-Duty Lithium-Base Grease

Booklet SP-9489, 8 pp, describes a heavy-duty, multi-purpose lithium-base grease for use where loads are high, shock loads may occur, and where machine element action is oscilating. Gulf Oil Corp.

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Multi-Purpose Greases

Information on six Litholine greases is presented in this product bulletin. Sinclair Refining Co.

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MATERIALS HANDLING

500- to 4000-lb Capacity Hoists

Speedway electric hoists are described in 12-pp Bulletin DH-133-F. Design features and details on suspensions and conducting systems included. Wright Hoist Div., American Chain & Cable Co., Inc.

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Wire Rope Electric Hoists

Six-pp Bulletin 905 describes electric wire rope hoists in capacities to 2 tons. Gives specifications, mounting options and sectionals. Hoist & Crane Div., Robbins & Myers, Inc.

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For Heavy Duty Applications

Featured in Circular 166 are electric hoists for heavy duty lifting applications. Capacity and lifting speed data is furnished in tabulated form. Chisholm-Moore Div., Columbus McKinnon Chain Corp.

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Custom Engineered Conveyors

Catalog 70, 57 pp, presents illustrations showing applications of various conveyor systems, including trolley, roller, slat, chain, belt and special units. Diagrams show cross sections of typical installations, dimensions and construction. A. B. Farquhar Co. and Conveyor Systems, Inc.

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Industrial Conveyors

Two types of conveyors—a trolley system pulled by a cable and a chainless conveyor—are featured in 16-pp Catalog CD-B. Advantages are detailed and installation pictured. The American MonoRail Co.

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Roller, Wheel Conveyors

Illustrated Catalog 158 contains 68 pp of data on roller and wheel conveyors for a variety of applications. Dimensional diagrams, load rating tables and photos of installations are given. Mathews Conveyer Co.

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Postage-free cards for ordering Bulletins are on pages 33-34. You may also use the cards to order literature mentioned in the ads.

Portable Conveyor Units

Operating principle of Airveyor transfer units is described in Bulletin A-20, with drawings showing typical applications. Fuller Co.

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Sheet, Coil Lifters, All Types

Detailed information on sheet and coil handling lifters and related equipment is presented in 24-pp Bulletin SL-32. Applications are pictured. Cullen-Friestedt Co.

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For Handling Stacked Sheets

Bulletin 1208B-N shows how company's magnetic sheet floater works and tells advantages in operations involving stacked steel sheets. Dings Magnetic Separator Co.

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Caster and Wheel Manual

Detailed engineering data and specifications on caster and wheels for all types of applications, including light and heavy duty industrial types, are presented in 192-pp Manual 66. Darnell Corp., Ltd.

For a copy, circle 411 on Post Card

Why Self-Dumping Hoppers

Cost-saving advantages of self-dumping steel hoppers for bulk handling are detailed in Bulletin 265. Roura Iron Works, Inc.

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SAFETY, SECURITY

Flame-Resistant Products

Structural panels, skylight louvers, chemical duct-work and other products of Hetron, a flame-resistant polyester resin, are covered in Bulletin D-6. Hooker Chemical Corp.

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CONTROL

New! Space savingest relay you've ever seen: New Cutler-Hammer "Compact 300"

Cutler-Hammer's new, versatile 300 volt 6 amp., industrial control relay is so reliable it's permanently sealed. Bifurcated contacts add even more millions of operations.

So compact you can get 8 circuits in a panel space only 2" wide by 2¾" high. 2, 3, 4, 6, 8 poles with any combination of N.O. or N.C. contacts available. Add new "mechanical memory" latch at any time. Same life as relay. Get full details in PUB. ED-L079-W274.

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Circle 646 on postcard, page 33

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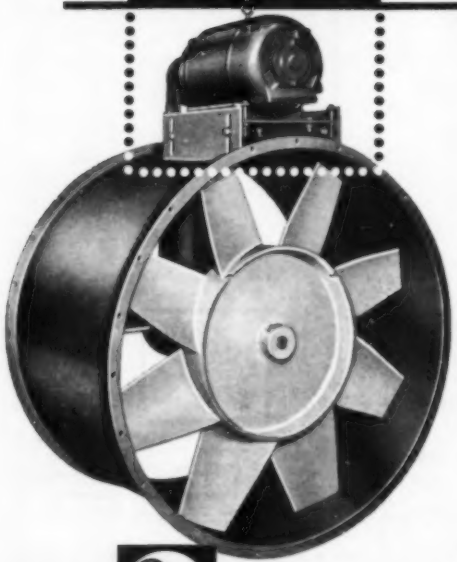

BELT-DRIVEN AXIAL FANS

PROPELLAIR Type BT Fans, sizes through 60", have universal mounting plates which accommodate motors to 30 HP. All bearing assemblies are sized for 50 HP loads. BT Fans can easily be field-modified to boost or decrease capacity, regardless of original rating, simply by changing the motor and V-belt drive. Use BT Fans for low-cost general duty, for handling corrosive or explosive fumes, extreme heat or high humidity. Straight-line design permits easy, inexpensive installation. A wide range of propeller designs permits selection for maximum efficiency at the operating range involved. Fans bear AMCA Certified Ratings to 84,000 cfm, free air. Write today for Bulletin 625PE.

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Circle 647 on postcard, page 33

DATA FILE

(Begins on page 226)

Fire-Resistant Fluids

This series of specification sheets on fire-resistant fluids covers synthetics, oil-in-water and water-in-oil emulsions, glycols. Mobil Oil Co., Inc.

For a copy, circle 414 on Post Card

Signals for Specific Operations

Tips on suitable signals for specific uses are offered in Bulletin 100. Horn, bells, warning lights and other equipment are described with wiring diagrams and audibility rating charts. Federal Sign & Signal Corp.

For a copy, circle 415 on Post Card

Signs for Industrial Safety

Catalog 11, 66 pp, illustrates signs for industrial accident prevention—danger, caution, directional, information and safety instruction signs. Prices given. Stonehouse Signs Inc.

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PUMPS, COMPRESSORS

Low Cost Centrifugal Pumps

Bulletin 3913 describes a double ball bearing end suction centrifugal pump, providing photos, performance tables and dimensions for seven sizes from 1 through 3 in. The Deming Co.

For a copy, circle 417 on Post Card

Pump Selection Catalog

Included in 12-pp, easy-to-use Circular 184 are charts showing temperature ranges from —350 to +1000 F, and pressures to 1000 sig for 10 classifications of pumps. Dean Brothers Pumps, Inc.

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Stainless Steel Pump Data

Stainless steel, nickel, Monel and other alloy pumps for handling corrosive liquids and those not permitting contamination are described in 8-pp bulletin. Viking Pump Co.

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Two-Stage Hydraulic Pump

Features of two-stage hydraulic pump, consisting of a gear pump for low pressure stage and five-cylinder, axial-piston pump for high pressure stage, are detailed in Bulletin V-1. Owatonna Tool Co.

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Rotary Gear Pumps

Features and advantages of the Gearex pump, which employs the basic rotary gear principle to move liquid, are detailed in 6-pp Bulletin G-3. Cutaway view illustrates construction. Sier-Bath Gear and Pump Co., Inc.

For a copy, circle 421 on Post Card

Compressors for All Requirements

Sixteen-pp Catalog 20 gives data on 200 models of gasoline- and electric-driven compressors for industrial and other applications. Features automatic start and stop and constant running units. Lincoln Engineering Co.

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Water-Cooled Compressors

Described in Bulletin LA-1 are the LA and LB water-cooled compressors, the LA for operation at normal plant pressures and the LB for high pressure use. Gardner-Denver Co.

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Compressed Air Fundamentals

Sixteen-pp Form 1548A on selecting a small packaged air compressor discusses compressed air and how it is compressed, single- and two-stage compressors, piston displacement, control used. Ingersoll-Rand Co.

For a copy, circle 424 on Post Card

To Speed Construction

Portable and tractor compressors designed to speed work and reduce construction costs are described in illustrated 8-pp Bulletin CG-15. Pneumatic air tools for use with portable compressors are shown. Le Roi Div., Westinghouse Air Brake Co.

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For Compressed Air Applications

Eight-pp Bulletin 350 describes and illustrates a horizontal, watercooled single-stage, heavy duty compressor designed to fit most compressed air applications. Pennsylvania Pump & Compressor Co.

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How to get drier or cooler AIR or GASES

at low cost

NIAGARA *AERO*® AFTER COOLER cools a compressed gas, or air, below the temperature of the surrounding atmosphere, thus preventing the condensation of moisture in your lines. The gas will contain only half of the moisture left in it by conventional methods. Even drier gas can be produced if you require it.

In working with controlled atmospheres of inert gases to prevent undesired reactions, this dryness of the gas at low cost is a great advantage. The cost of the Niagara method is low because it uses evaporative cooling, saving 95% of the cost of cooling water (and its piping and pumping). This direct saving of cost pays for the Niagara cooler in less than two years.

If you use compressed air to operate instruments or pneumatic equipment you will get better results by using the Niagara Aero After Cooler.

Write for Bulletin 130, or ask nearest Niagara Engineer if you have a problem involving the industrial use of air.

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Niagara District Engineers in Principal Cities of U. S. and Canada

Circle 648 on postcard, page 33

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The ONLY Ratchet with ALL these important features!

(1) Slenderizing head
(2) Thumb-operated reversing lever specially designed so it won't come off
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(5) Thin handle with knurled grip
(6) Hole in handle for convenient hanging
(7) Fine-toothed gear
(8) Easy ratcheting action

(9) ¼", ⅜", and ½" square drives (two handle lengths in ½" drive)

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Your local ARMSTRONG Distributors will supply you a Catalog and demonstrate the new ratchets. If you don't know who he is, write us for his name.

ARMSTRONG BROS. TOOL CO.

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Circle 649 on postcard, page 33

FREE BOOKLET TELLS WHY TRANSITE® PIPE DELIVERS INDUSTRIAL WATER AT LOW COST

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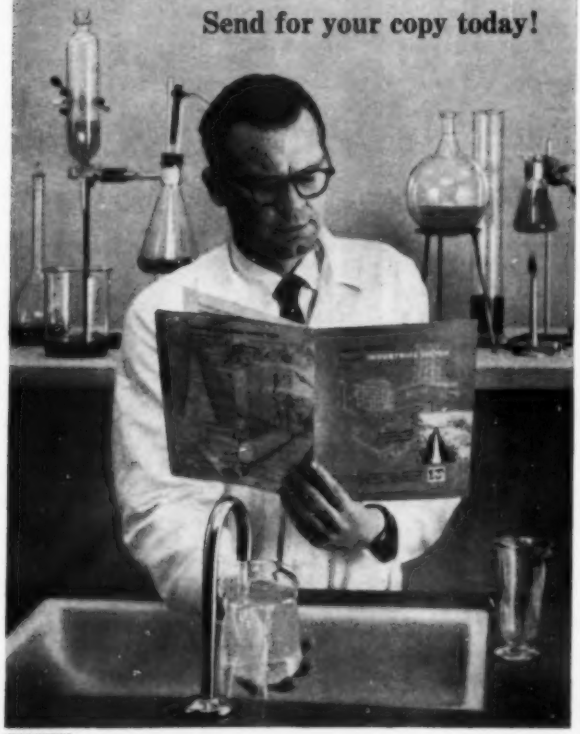

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Circle 650 on postcard, page 33

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INDUSTRIAL COMBUSTION

HEV-E-OIL OR POWER GAS BURNERS

The heart of any boiler is the burner that fires it. Leading engineers, contractors and architects have found HEV-E-DUTY BURNERS prove dependable in institutional and commercial buildings where reliability is essential.

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HEV-E-DUTY BURNERS start smoothly and safely with low-fire. Burner modulates from low to high fire for efficient combustion over complete fuel range.

Every HEV-E-DUTY BURNER is completely assembled, wired, tested and fired at the factory. Installation is quick, easy and money-saving. Install as replacements on existing boilers or new boiler installations. If you need engineering advice, count on us.

As the heart — HEV-E-DUTY BURNERS give you trouble-free operation day after day . . . without frequent service and constant worry.

Capacities from 720,000 to 21,000,000 BTU's. Meets all code standards; Underwriters' Laboratory approved.

Write HEV-E-DUTY BURNERS, Dept. G-111 today for complete information.

MATCHED FOR MAXIMUM EFFICIENCY Now available, the HIGHLANDER BOILER is matched to the maximum performance of HEV-E-DUTY BURNERS. The perfect marriage of a boiler and burner unit eliminates the problem of trying to match a burner to any random boiler. To guarantee perfect operation the entire unit — both boiler and burner — is completely approved by Underwriters Laboratory with certified rating for output.

EASY FUEL CHANGE-OVER: Models available for gas or oil or combination gas/oil.

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Circle 651 on postcard, page 33

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Equip your plant with Roura Hoppers—just as thousands of others have! You'll cut as much as half the cost of handling scrap and all other bulk materials. Put Roura Hoppers to work moving scrap, metal small castings, cinders, punch press parts, glass, hot forgings or cullet. You'll see the savings right away.

A Roura Hopper may be carried by any lift truck (fork or platform) . . . and with complete safety. A simple latch lets it automatically dump and then return to a locked upright position when empty. For more information, phone us collect at TOwnsend 8-3560 or use coupon.

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Circle 652 on postcard, page 33

DATA FILE

(Begins on page 226)

Heavy Duty Air Compressors

Performance details and basic construction features of heavy duty air compressors for continuous operation are detailed in 36-pp Bulletin A-43. Data tables included. Joy Mfg. Co.

For a copy, circle 427 on Post Card

PACKINGS, SEALS

For Hydraulic, Pneumatic Service

Specifications and applications of rubber, rubber and fabric, leather and Teflon molded cups for hydraulic and pneumatic service are given in revised Bulletin AD-189. Contains photos and charts. Garlock Inc.

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Mechanical Seals

Sealing of slurries with company's mechanical seals is detailed in Technical Bulletin CP-580. Selection details are included. Chemical & Power Products, Inc.

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MECHANICAL POWER TRANSMISSION

Adjustable Speed Fluid Drives

Bulletin 9819, 8 pp, describes adjustable speed Gyrol fluid drives, 1- to 25-hp, giving advantages, applications, components and operation. Industrial Div., American-Standard.

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Versatile Magnetic Drives

Features of magnetic drives in ratings of 50 to 2500 hp are described in Bulletin 3650, 6 pp, with cutaway views illustrating components and designs. Typical applications are shown, and specifications and dimensions charted. The Louis Allis Cc.

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Frequency-Controlled Speeds

Illustrated Bulletin F-1963, 8 pp, explains company's Varidyne principle whereby any a-c motor is converted to variable speeds by varying frequency of a-c supplied to motor (or motors, in multi-motor application). Describes power unit used. U. S. Electrical Motors, Inc.

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Compact V-Belt Drive Handbook

Bulletin A695A, 42 pp, describes advantages of V-belt drives of narrower and more powerful belts and sheaves. One section contains detail, charts and nomographs for designing special drives. Dodge Mfg. Corp.

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Standard Spring Clutches

Described in this 30-pp catalog are five lines of spring clutches in bore sizes from ⅛ to 1 in., torque capacity to 1250 lb-in. for applications utilizing drive up to 5 hp. Clutches include over-running and back-stop-

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1. QUALITY is important. When you invest in a fence you want it to last for a long, long time. When you specify PAGE you get 77 years of our experience in the design and manufacture of a quality fence. Page Fence is engineered for long-lasting service.

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Helpful booklet describes fence styles, gates and, components

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A product of Page Steel & Wire Division American Chain & Cable Co., Inc.

Circle 653 on postcard, page 33

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V-Belt Fabrication, Quality

Machines and processes involved in V-Belt fabrication are described in 16-pp Booklet S51106. Testing, inspection, and control of their quality are explained in Booklet, S51107. The Goodyear Tire & Rubber Co.

For a copy, circle 435 on Post Card

Reader Service Cards for ordering catalogs are on pages 33 and 34.

Improved Couplings

Detailed information on torsionally resilient Steeliflex couplings is presented in 24-pp Bulletin 4100. Charts and tables give engineering data; photos and diagrams illustrate design features. The Falk Corp.

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Anti-Friction Bearings

Catalog 424-D, 8 pp, gives capsule presentation of company's line of anti-friction bearings, describing each product. SKF Industries, Inc.

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Ball Bearing Pillow Blocks

Heavy duty pillow blocks with self-aligning, single row, deep-groove precision ball bearings are featured in Folder 2951. Interchangeability chart included. Link-Belt Co.

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PROCESSING, FINISHING

For Industrial Processing

Illustrated and described in this 20-pp bulletin are ovens, parts washers and phosphatizing machinery, dust and fume collectors and spray booths. Gallagher-Kaiser Corp.

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Thickening Equipment and Methods

Detailed information on mechanical thickeners for chemical, metallurgical and industrial processing is presented in 24-pp Bulletin 3002. Single and multiple compartment thickeners are described. Dorr-Oliver Inc.

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Blowers for Agitation Applications

Bulletin 142C describes turbine type blowers for sewage treatment and other agitation applications in chemical, food processing and other fields. The Spencer Turbine Co.

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Finishing Equipment

Contained in this file folder is a series of product bulletins on manual and automatic finishing equipment, including spray guns, nozzles, pumps, tanks, heaters, air compressors, regulators, hose. The De Vilbiss Co.

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Special Machines for Industry

Custom-engineered air and hydraulic operated machines for industrial operations are featured in Bulletin 7-A. Logansport Machine Co., Inc.

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FILTERING

Filters for Industry

Illustrated and described in this product bulletin are filters for many applications, including liquid filters, intake filters, pipe line filters, others. The Dollinger Corp.

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Improved Filters

Bulletin GEO-507 describes Fulflo filters for compressed air and other gases, covering single tube models for operating pressures from below 125 psi to 4000 psi, and flow rates to 800 scfm; also multi-tube models. Commercial Filters Corp.

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MAINTENANCE

Corrosion Protection for Chimneys

Stackfas, a product resistant to acid corrosion of high sulfur fuels, is described in 6-pp Brochure SF. Stresses value in protecting new and existing chimneys, and compares it with conventional coatings in resistance to acids, heat, fly ash abrasion etc. Benjamin Foster Co.

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CSI Farquhar CONVEYORS SINCE 1856

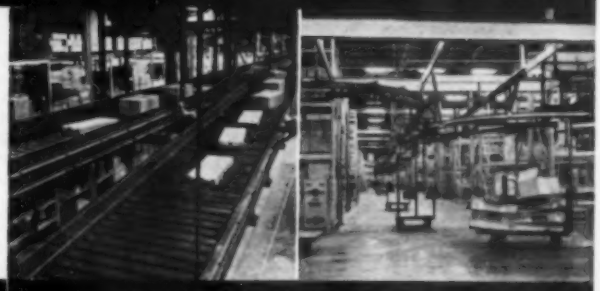
FIND OUT HOW TO MOVE MORE MATERIAL *FASTER . . .* AND AT LESS COST!

PORTABLE BULK CONVEYORS

Model 431 Horizontal or Incline

PORTABLE PACKAGE CONVEYORS

Model 343 Trough Conveyor



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Complete lineup of portable and fixed package handling machines—gravity, power belt, power roller, booster conveyors and many others. Ask about our standard components for do-it-yourself installation. Send for Package Portfolio today!

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CSI—Farquhar has designed and built thousands of custom systems in every kind of industry for many different products. 56 page Brochure No. 70 illustrates a wide variety of engineered systems. Send for your copy now.

A-B FARQUHAR DIVISION CONVEYOR SYSTEMS, INC.

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Phone Chicago—JU 8-0200

Circle 654 on postcard, page 33

NEW MANAGEMENT TOOL CHECKS PRODUCTIVITY OF 40 MACHINES

Now progressive management can have a continuous and permanent check on 40 machines or processes at a central point. With the EAI Bar Chart Recorder you can determine actual machine productivity as well as standby, inoperative, or downtime. Other information can also be recorded. ■ *EAI Bar Chart Recorders have enabled alert managements to make substantial increases in output without increasing machine investment. Evaluations of plant layout, work schedules and equipment or process effectiveness have been greatly simplified. The recorder normally pays for itself many times over in the average plant in one year.* ■ *Typical applications include scheduling of computers and data processing equipment, office machines, machine tools, commercial laundry equipment, printing equipment, piece-part processing or manufacturing operations.* ■ *Write for information today on how this recorder can assist you in reducing your operating costs.*

EAI

ELECTRONIC ASSOCIATES, INC.
Long Branch, New Jersey

Circle 655 on postcard, page 33

DATA FILE

(Begins on page 226)

Epoxy Maintenance Coatings
Chemical and physical properties of epoxy systems used in industrial maintenance coatings are detailed in a bulletin called "What are Epoxies?". Epoxy resins used in these formulations are covered. Hauger-Beegle Associates, Inc.

For a copy, circle 447 on Post Card

Protective Coating Systems
Several protective maintenance coating systems designed to solve corrosive problems are detailed in this 16-pp bulletin. Index tab indicates where a particular system should be used. The Glidden Co.

For a copy, circle 448 on Post Card

Reduce Painting Costs
This 12-pp booklet is designed to help reduce painting cost by accurate cost analysis. Some economy facts described and illustrated are: why "cost per gallon" is unreliable, a formula for price comparison, how to estimate labor savings, special conditions needing special paint etc. Barreled Sunlight Paint Co.

For a copy, circle 449 on Post Card

Coatings for Industrial Applications
Detailed information on coatings for industrial uses, including anti-corrosive coatings, decorative finishes, floor materials, fungus treatments, interior and exterior wall and roof coatings is given in 40-pp Catalog 59. Steelcote Mfg. Co.

For a copy, circle 450 on Post Card

Descale Easily and Safely
How non-fuming dry acid cleaners, based on sulfamic acid descales equipment easily and safely without pitting, cracking and corroding is described in this bulletin, with comparison photos and applications shown. E. I. du Pont de Nemours & Co. (Inc.)

For a copy, circle 451 on Post Card

Pyramid Ladders, Platforms
Catalog 159, 20 pp, describes pyramid-design step ladders, hydraulic lifts and fixed or adjustable-level work platforms for above-floor working safety. Ballymore Co.

For a copy, circle 452 on Post Card

Elevator Maintenance Guide
How proper care safeguard elevator service and prevents costly repairs is the subject covered in this 24-pp booklet. A program organized to protect elevators at economical cost is given. Otis Elevator Co.

For a copy, circle 453 on Post Card

Brushes For Industry
Catalog 200, 46 pp, on industrial brushes, tells factors to consider in power brush selection. Power and hand brushes for industrial requirements are illustrated and described. Newark Brush Co.

For a copy, circle 454 on Post Card

Wire Cloth—Filter Cloth
Available from stock in all alloys, all weaves, all meshes, up to 244" wide—in rolls or cut to size. "Micromesh" ultrafine strong stainless filter cloth for retention of particles from 25 to 5 microns. Also backing and spacing cloth and screens.

Rescreening Service
On tension rings for vibrating screens.

Neva-Clog
Double layer, perforated, alloy sheet medium—smooth, strong, rigid—for diatomite filters, centrifuges, ion exchangers, carbon towers, dust and fume control.

Filter Leaves
"Rim-Lok" and other Multi-leaves for pressure filters; standard leaves for stationary and rotary filters.

Strainers
"Individualized" strainer elements and housings, designed and built by Multi-Metal to meet process needs not served by available standard units.

Custom Fabrication
Requiring wire cloth elements: screens for filter presses, tubular filter elements, cylinders, baskets, process unit components, etc.

Write for Catalog 57.

MM MULTI-METAL WIRE CLOTH CO., INC.
1363 Garrison Ave., New York 59, N. Y.

Circle 656 on postcard, page 33

Acme ACME Electric

FURNACE TRANSFORMERS

DO THE JOB!

Designing Furnace Transformers is a job for experts — and Acme Electric engineers have the experience, the "know how" and the facilities to design and build the kind of transformers that will successfully handle the difficult requirements of electric furnace requirements.

The transformer illustrated is one of several, connected to a vacuum furnace and operating at preselected temperatures over a range of 1900° to 2500°C. which must be maintained within close limitations.

If you need Furnace Transformers as part of the equipment for special, secret or unusual temperature processing, Acme Electric is your best source of supply.

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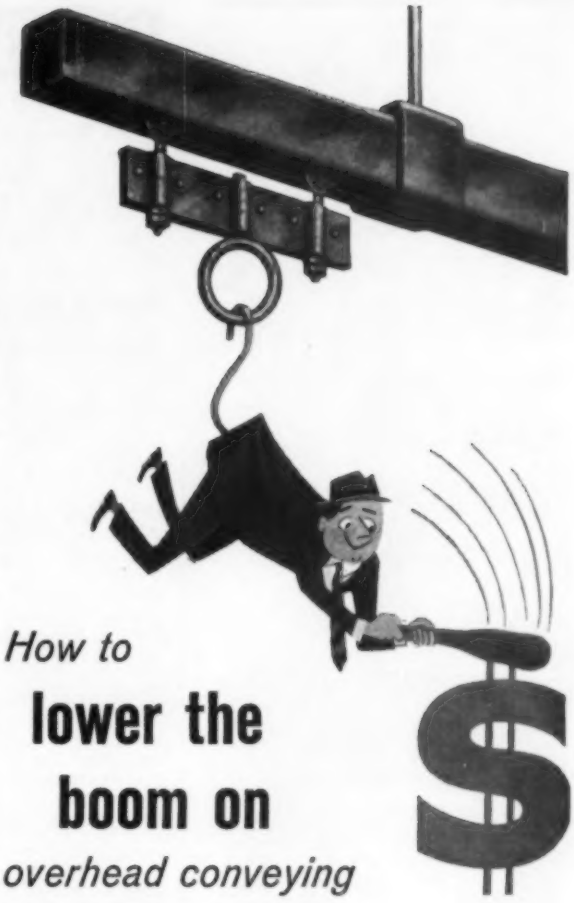
Acme ACME Electric
TRANSFORMERS

Circle 657 on postcard, page 33



How to

lower the boom on

overhead conveying costs

Have an overhead conveying problem? If so, CF&I probably has the answer with an easy-to-install, custom-designed, cost-cutting conveying system. CF&I-Coburn systems operate on a pay-as-they-go basis — everytime they move a product they return dividends in labor efficiency, speed of handling and more effective usage of floor space. And the rugged high quality of all Coburn equipment keeps repair and replacement costs to a minimum.

Designed to speed up materials handling operations, Coburn systems have the flexibility of sectionally-designed equipment that permits their adaptation to almost any overhead conveying need. That's another reason why so many production men, engineers and materials-handling specialists look to Coburn for the equipment that gets the job done and keeps the cost down.

CF&I also makes a complete line of Coburn sliding door and fire door hardware. For a free copy of Catalog 220 on Overhead Conveying Equipment or further information on Coburn door hardware, write: Coburn Products, The Colorado Fuel and Iron Corporation, Wickwire Spencer Steel Division, P. O. Box 311, Palmer, Massachusetts.

The Colorado Fuel and Iron Corporation
Denver • Oakland • New York
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CF&I STEEL

Circle 658 on postcard, page 33

IF YOU HAVE A LOADING DOCK

you'll want this **free** *fact filled booklet*

"FACTS, FIGURES, IDEAS on Loading Docks" operation gives specific information on: • General Design Standards for Dock and Terminals • Methods of Bridging the Gap between Dock and Truck • Methods of Dock Pit Construction • Weight and Size Restriction by States for Trucks and Trailers • Unit Loading • Comparison of Unloading Time • Selecting the Right Size Ramp • as well as many other ideas on Loading Docks you can use in your daily operations.

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Please send me your FREE Facts, Figures, Ideas booklet.

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Company

Address

City Zone State

233 West Oklahoma Ave., Milwaukee 17, Wis.

IN SWEET'S (S) 23a/Am

Circle 659 on postcard, page 33

DATA FILE

(Begins on page 226)

Drain, Supply Line Cleaner
Bulletin 685Du describes a drain and supply line cleaner featuring a lightweight alloy housing, giving advantages. Kollmann Mfg. Co.

For a copy, circle 455 on Post Card

OTHER EQUIPMENT

Compressed Air Products Guide
Color-coded for product identification, Catalog 158, 24-pp, contains information on filters, regulators, lubricators, drains and accessories. Wilkerson Corp.

For a copy, circle 456 on Post Card

Industrial Hose, Expansion Joints
Selection data and specifications on corrugated industrial hose made of pressure tubing are presented in 12-pp Catalog 233. Includes section on expansion joints. Flexonics Div., Calumet & Hecla, Inc.

For a copy, circle 457 on Post Card

Guide to Silicones
Engineering Guide 1-115, 12-pp, explains how various physical forms of silicones contribute to reliability, miniaturization, modularization and environmental protection, increase serviceability over wide extremes of temperature. Engineering data included. Dow Corning Corp.

For a copy, circle 458 on Post Card

For Closed Circulating Systems
Described in this bulletin is Sun 21, heat-transfer oil for use in closed circulating systems with expansion tanks. High thermal efficiency and stability, easy circulation and other advantages covered. Sun Oil Co.

For a copy, circle 459 on Post Card

Industrial Plastics
This 12-pp booklet contains property and application data on mill shapes of nylon, TFE fluorocarbons, polycarbonates, chlorinated polyethers and cross-linked polystyrere, as well as nylon pressure hose and tubing. The Polymer Corp. of Penn.

For a copy, circle 460 on Post Card

Keys to Steel Satisfaction
Design, steel selection and heat treatment are described as the keys to optimum economy and material performance in this 77-pp manual of basic information on increasing endurance limit of steels through this combination. Climax Molybdenum Co., Div., American Metal Climax, Inc.

For a copy, circle 461 on Post Card

Power Gas Burners
Bulletin 2 describes power gas burners with or without auxiliary oil burners. Advantages of design and operation are detailed. Tables give gas input, horsepower net standing radiation. Industrial Combustion Inc.

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VULNERABLE CIRCUITS NEED

LIQUATITE®

FLEXIBLE CONDUIT PROTECTION

Liquatite insures against costly down time due to wiring failure. It protects against contamination, vibration, motion and shock; proves ideal for "wet locations," around corrosives or where severe punishment may cause shorts or burn-outs.

Added to this, Liquatite installs as easily as any Flexible Conduit —follows contours, takes small radius bends necessary for hard-to-get-at locations.

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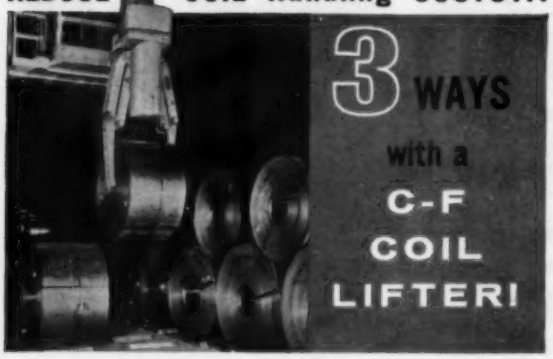
P. O. Box 128-I • Roselle, Ill.

Circle 660 on postcard, page 33

REDUCE COIL Handling COSTS...



1 **SAVE MANPOWER**—only 1 man, the crane operator, is required to operate the C-F Coil Lifter above.

2 **SAVE SPACE**—you can operate a C-F Coil Lifter in a minimum of space, as little as 10" to 12", between piles, regardless of coil width.

3 **ELIMINATE DAMAGE**—the strong mechanical grip, and legs remaining vertical at all times prevent any damage to stock or material.

Motorized C-F Coil Lifters with Motorized Swivels as above are designed for safe, fast, efficient one man operation. They allow the crane operator to grab, lift, carry and rotate, set down and release the load precisely—in minimum space—without additional help.

WRITE NOW FOR NEW BULLETIN **SL 32.**

CULLEN-FRIESTEDT Co.

1317 S. Kilbourn Ave. • Chicago 23, Ill.

Circle 661 on postcard, page 33

Markal
HEAT-PROOF COATINGS

Brush MARKAL Coating on piece of metal and apply direct flame of torch until metal is red hot. *Protective coating has not been impaired.* MARKAL Coatings give you complete protection against steam, corrosion, scaling, oxidation at extreme heat—temperatures up to 2100°F.

Write for complete technical information and free sample . . . state work conditions.

Markal COMPANY

3085 West Carroll Avenue • Chicago 12, Illinois

The Mark of Quality Protection—MARKAL!

Circle 662 on postcard, page 33

Don't take our word for it—try a new RIDGID Flaring Tool! See if you don't get smoother, stronger, more uniform flares . . . in less time and with less effort than ever before!

Then, compare this new RIDGID Flaring Tool, feature-by-feature, with any flaring tool you've ever seen or owned:

• Feed releases automatically when flare is fully formed. • Reversing feed screw burnishes flare. • Hardened steel die bars are precision-machined. • Large, comfort-grip feed screw handle turns easily. • Precision-ground, hardened steel flaring cone, eccentrically mounted in precision bearings, produces rolling action for even metal flow . . . gives uniform flare walls without galling. • Tubing hole sizes are clearly marked. • Easy sliding rugged malleable yoke serves as stop for tubing to give correct flare size. • Yoke clamp screw fits into centering hole . . . locks bars, yoke and tubing into perfect alignment. • Stop pins keep yoke on die bars at all times . . . yoke can't slide off.

3 MODELS:

RIDGID No. 457 for 45° flares, ⅛" to ⅝" O.D. (7 sizes)
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See and try these new RIDGID Flaring Tools. Your Supply House has them.

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Circle 663 on postcard, page 33

GO UP WITH CONFIDENCE ON

BALLYMORE

Safety-Step

LADDERS

GRIPS THE FLOOR ROLLS EASILY

Now . . . Ballymore combines welded steel or aluminum safety treads with wide-base pyramid design to offer extra safety and stability. Ballymore ladders let you climb quickly . . . and with confidence—any required height up to 15 feet. Spring-mounted casters that retract when you step on the first step is another safety "plus." They let you roll the ladder easily, yet grip the floor surely to provide safety at all levels.

All welded, corrosion-resistant Ballymore Safety-Step Ladders are available in four types—with 47 models to choose from. Step up to a new standard of safety today.

WITHOUT HANDRAILS

WITH HANDRAILS

For illustrated catalog covering complete line, write to

BALLYMORE COMPANY, WEST CHESTER 29, PA.

BALLYMORE

EQUIPMENT FOR WORKING *Safely* ABOVE FLOOR LEVEL

Call your LOCAL DISTRIBUTOR

Circle 664 on postcard, page 33

DATA FILE

(Begins on page 226)

For Economical Operation
Automatic boilers (with the two-pass design) are discussed in Form BE-400. Covers 20 to 600 hp steam, hot water and HWT boilers. Boiler Engineering & Supply Co., Inc.

For a copy, circle 463 on Post Card

Preformed Wire Rope
Folder 4930 describes corrosion-resisting preformed wire rope of stainless steel and monel metal designed to meet variety of service requirements. Table shows breaking strength in pounds for various constructions and sizes. Macwhyte Wire Rope Co.

For a copy, circle 464 on Post Card

Insulation for Industrial Equipment
This set of six specifications covers applications of Foamglas insulation for industrial equipment and piping. Each booklet contains tables of suggested thickness of insulation to be applied, installation procedure given. Pittsburgh Corning Corp.

For a copy, circle 465 on Post Card

The Wire Story
Catalog W-201, 72 pp, illustrates history of steel wiremaking from ore to finished wire. Includes description of flat and shaped wire, low carbon coarse wire, high and low carbon fine and specialty wire, and numerous tables of weights and measures. The Colorado Fuel & Iron Corp.

For a copy, circle 466 on Post Card

Industrial Skin Packaging
A clear explanation of the skin packaging operation is covered in Bulletin MS-2058, 8 pp, with low-cost packaging, inventory control, product identification and other advantages listed. Photos show applications. Union Carbide Development Co.

For a copy, circle 467 on Post Card

Industrial Skin Cleaners
Featured in this product bulletin are three skin cleaners designed for industrial plant use. A granulated cleanser, a heavy duty type, and an extra fine granulated cleanser are discussed. Sugar Beet Products Co.

For a copy, circle 468 on Post Card

Labor-, Power-Saving Condenser
Bulletin 131 shows benefits of panel construction of Aeropass evaporative condensers with 100 to 240-ton refrigeration capacities. Illustrations and diagrams explain units functionings with Duo-pass pre-cooling coil and oil remover. Niagara Blower Co.

For a copy, circle 469 on Post Card

Hose, Fittings, Couplings
Industrial Catalog 204, 40 pp, contains information on hose, fittings, self-seal couplings and related products. Provides specifications on products for industrial applications, power plants etc. A hose selector chart lists applications. Aeroquip Corp.

For a copy, circle 470 on Post Card

Multiple Power Positioner
Catalog 500A, 10 pp, features the Hanna-Power Positioner designed for multiple positioning of electro-mechanical drives and for indicating positions of mechanical elements. Explains how it works, and gives dimensions. Hanna Engineering Works.

For a copy, circle 471 on Post Card

Stabilized Polypropylene Tubing
Characteristics and performance advantages of Impolene thermoplastic tubings are detailed in 12-pp Engineering Report 301. Table of comparative chemical resistance is included. Imperial-Eastman Corp.

For a copy, circle 472 on Post Card

Facts on Cathodic Protection
Ideas on cathodic protection for the treatment plant are presented in 6-pp Bulletin M-112-E-1. What cathodic corrosion protection can do and where it should be used are discussed, and installation details included. Electro Rust-Proofing Corp.

For a copy, circle 473 on Post Card

Aluminized Steel Wire, Products
Described in 6-pp Folder DH-537B are steel core wires, steel strand guy wire, overhead ground wire, tie wire, messenger wire, telephone wire, chain link fabric and barbed wire. American Chain & Cable Co., Inc.

For a copy, circle 474 on Post Card

Preheating Combustion Air
Fuel savings and increased performance made possible by using waste heat in the flue gases to preheat in-

TANK-O-METER

FOR MEASURING TANK CONTENTS ANY DISTANCE AWAY

TANK MAY BE BURIED, ELEVATED, OPEN, CLOSED, VENTED OR UNDER PRESSURE OR VACUUM

SEND FOR BULLETINS

Also gauges for:
Barometric Pressure (Mercury Column)
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Pressure and Vacuum
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Inclined Manometers for draft, pressure or differential pressure.

UEHLING INSTRUMENT CO. 14 VESPER ST., PATERSON, N. J.

Circle 665 on postcard, page 33

WHIP ACID, ALKALI & CHEMICAL FLOOR PROBLEMS

WITH

Steelcote FLOOR-NU

PATCH • RESURFACE • GROUT

ITS MANY ADVANTAGES ARE PROTECTED BY PATENT NO. 2,934,452

Don't let floor problems floor you. Eliminate them with FLOOR-NU.

It resists corrosion and extreme weight. Reduces floor repairs and reduces costs of labor and lost time. Protects new concrete, resurfaces or patches old.

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protection for machinery and equipment heretofore impossible with an air dry organic finish

EPO-LUX 100

(AN EPOXY PRODUCT)

Protects against corrosion of acids, alkalis, and moisture where other coatings fail.

America's Foremost Wet Wall Enamel

DAMP-TEX

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FOREMOST IN PROVED PERFORMANCE

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FOREMOST IN MONEY-SAVING QUALITY

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Circle 666 on postcard, page 33

TAKE ANOTHER LOOK AT WARNING SIGNALS!

SIRENS, HORNS & BELLS

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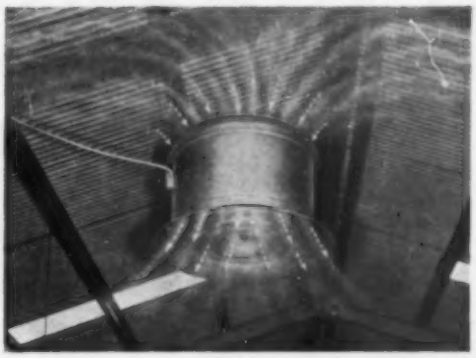
Circle 667 on postcard, page 33

HOW TO REDUCE FUEL BILLS



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MODEL HR (HEAT RECIRCULATOR)

recovers and returns heat normally trapped under roof line. Motor-operated fan pulls heat into top of unit and diffuses it down thru conical openings, obtaining maximum floor coverage.

No holes required in roof — **Old or new construction**

Simple installation — **Unit sizes 280 to 30,000 cfm**

Send for complete details and assistance in unit size selection. Representatives in principal cities.

Genie-Air PRODUCTS

A Division of the N. T. W. Corporation

3001 East 11th Street — Los Angeles 23, California

Circle 668 on postcard, page 33

DATA FILE

(Begins on page 226)

coming combustion air are explained in 36-pp booklet. Air Preheater Corp.
For a copy, circle 475 on Post Card

Incinerator Selection Data
"The Blue Book of Incinerators" contains 16-pp of data on selecting incinerators for all types of applications, factors to consider in layout and specifications. Joseph Goder, Inc.
For a copy, circle 476 on Post Card

Compact Cooling Towers
Dimensional data and diagrams on single-cell and multi-cell cooling towers are presented in this 6-pp bulletin, along with specifications, performance data. The Marley Co.
For a copy, circle 477 on Post Card

For Cleaner Furnaces
The use and application of Oxi Crystals to keep furnaces and the fireside of boilers free of slag, encrusted carbon, soot and fire-scale is described in this pamphlet. Oxi-Kor Corp.
For a copy, circle 478 on Post Card

For On-The-Job Hand Washing
This brochure illustrates and describes advantages of the waterless washroom unit for hand washing. The waterless skin cleanser, dispenser and waste receptacles are detailed. Sugar Beet Products Co.
For a copy, circle 479 on Post Card

Heat Exchangers
Illustrated and described in Bulletin HE-260 are heat exchangers for heating and cooling fluids. Describes heating and refrigeration components. Bell & Gossett Co.
For a copy, circle 480 on Post Card

"I'm not interested in any six-day study course . . . my wife teaches me anything I don't know."

For Controlled Feeding
Weighing, batching and proportioning systems for controlled weights and rates of material flow in industry are described in 48-pp Catalog 941. Includes data on constant weight feeders, rotary bin check valves. The Jeffrey Mfg. Co.
For a copy, circle 481 on Post Card

Safety Plate Applications
Practical ideas on truck repair and maintenance with safety plate designed for strength protection and traction are presented in 24-pp booklet. Illustrated applications include tailgates, bumpers, steps, protective panels, trim, walkways, loading ramps. Inland Steel Co.
For a copy, circle 482 on Post Card

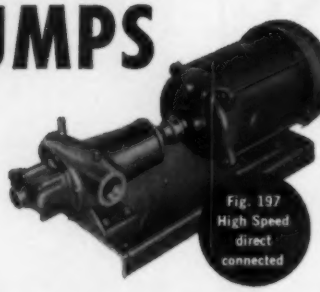
Blast Cleaning Methods, Equipment
Blast cleaning and finishing methods and equipment are provided in Bulletin 1230, 24 pp. Features blast cleaning barrels, tables, descaling machines, dust control equipment and abrasives. Pangborn Corp.
For a copy, circle 483 on Post Card

Maintenance Record System
Featured in 8-pp Bulletin SB-43 is a visible productive maintenance record system with lubrication and inspection schedules. Shows forms designed to promote accurate scheduling and maintenance follow ups. Acme Visible Records, Inc.
For a copy, circle 484 on Post Card

Tinting for Sun Protection
Advantages of a glass tinting process that is applied to existing windows and glass areas are detailed in Pam-

HIGH SPEED-HEAVY DUTY
3 to 30 G.P.M.
VIKING PUMPS
for thin or thick liquids

- fuel oils
- solvents
- lube oils
- alcohol
- other liquids



Here you are—really rugged pumps—designed for high speed and heavy duty, giving smooth, positive delivery of thin or thick fuel and lube oil, solvents, alcohols and other liquids. They're built for continuous or intermittent duty in such applications as filtration, circulation, transferring and booster service.

Capacities range from 3 to 30 G.P.M. Speeds from 600 to 1750 R.P.M. Temperature range from –40 to 225 degrees F., viscosity range from 30 to 10,000 S.S.U. 100 P.S.I. for non-lubricating liquids. 200 P.S.I. for lubricating liquids.

Install these new heavy-duty Vikings and enjoy the best pumping service you've ever known!

For additional information, ask for Bulletin SP-522Z

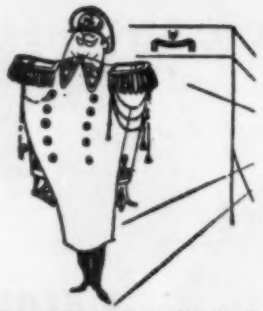
50 YEARS

VIKING PUMP COMPANY

Cedar Falls, Iowa, U.S.A. In Canada, It's "Roto-King" Pumps

See Our Catalog in Sweet's Plant Engineers File

Circle 669 on postcard, page 33



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Special rates by the month or lease

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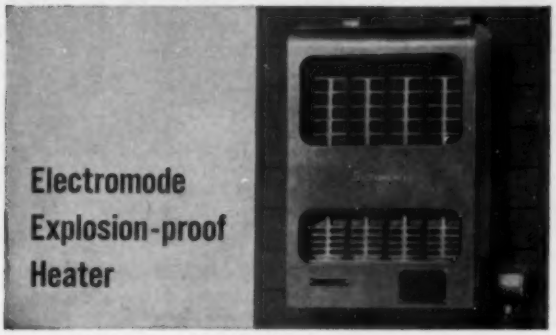
Safe... Electric Heating for Hazardous Locations



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  1. Outputs of 3,413 to 20,490 BTU where atmospheres contain gasoline, naphtha, benzol, alcohol, natural gas, acetone, lacquer.
  2. Output of 1,706 BTU (panel heater) where ethyl ether vapors are present.
- **Comfortable, even-flowing heat.**
- **Exclusive cast-aluminum Safety Grid.**
- **Available in 120, 208, 240 or 480 volts.**

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Circle 671 on postcard, page 33

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Adheron*

epoxy coatings

METAL... WOOD... MASONRY

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Send for free literature today. Learn how Adheron epoxy products can help you cut maintenance costs. Get *positive* protection against acids, alkalis and corrosive fumes.

** Proven during more than 5 years of industrial use*

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Circle 672 on postcard, page 33

ON THE BUS THAT GOES HERE

YOU COULD SAVE $3000

BY SPECIFYING ALCOA ALUMINUM

If you had been present when this plant* in Wickcliffe, Ohio, was being built, you might have been confronted with the problem of installing bus to carry the 12,000-amp load from four rectifiers to the six plating lines.

The alternatives were either copper or aluminum. The choice was obvious: *aluminum*. Because aluminum bus to do the equivalent job cost $3,000 less than copper.

This saving in direct material costs is just the beginning when you specify Alcoa® aluminum bus conductor.

You'll also find that aluminum is easy to handle, since it weighs only one-half as much as copper. You can cut it, drill it, bend it—with ease and complete satisfaction.

With Alcoa bus, you have a wide choice, too. Select from flat, round, tubular, channel, integral web and sector shapes.

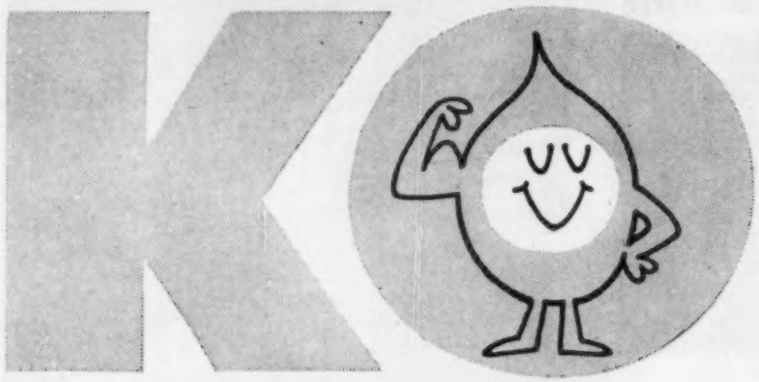
If you'd like more details about getting the job done and saving money with Alcoa aluminum bus, contact your Rome Cable Division representative. Or refer to our definitive 270-page volume, entitled "Alcoa Aluminum Bus Conductor Handbook." Address your inquiries to Rome Cable Division of Alcoa, Dept. 5-111, Rome, N. Y.

*Name furnished on request

ALCOA
ROME CABLE
DIVISION

Circle 673 on postcard, page 33

Knock out grease and dirt with



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(Begins on page 226)

phlet Form F-347-1. American Glass Tinting Corp.

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On Wire Cloth

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For general, industrial and chemical service
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Pumping Temperature: —150° F to plus 350° F
Working Pressure: to 180 psig @ 350° F

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DEAN BROTHERS PUMPS INC.
INDIANAPOLIS 7, INDIANA
The Best Is Our Standard

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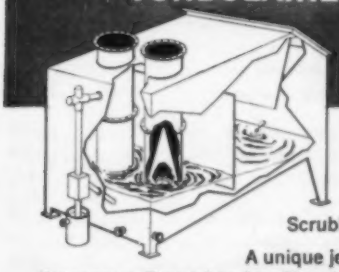
Jet-scrubs gasses CLEAN
. . . with no moving parts
TURBULAIRE SCRUBBER



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WESTERN PRECIPITATION
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Why pay for *more* Door Insulation than you *really* need?

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PREST-O-MATIC®
LIGHT COOLER DOOR

Maintains desired temperatures between 45° and 70°

If you're concerned with moderate temperature areas rather than zero degree refrigeration, here is the answer you've waited for!

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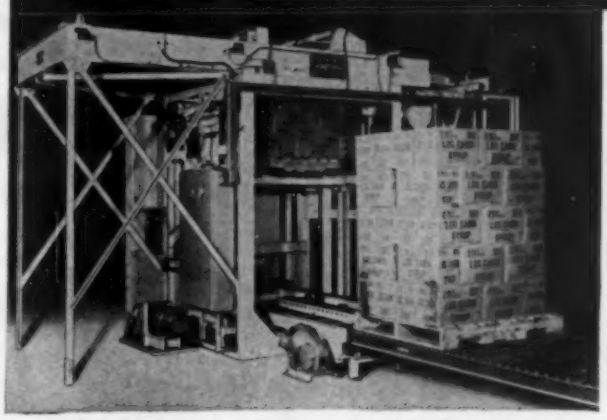
that are delivering outstanding performance in the food and chemical industries



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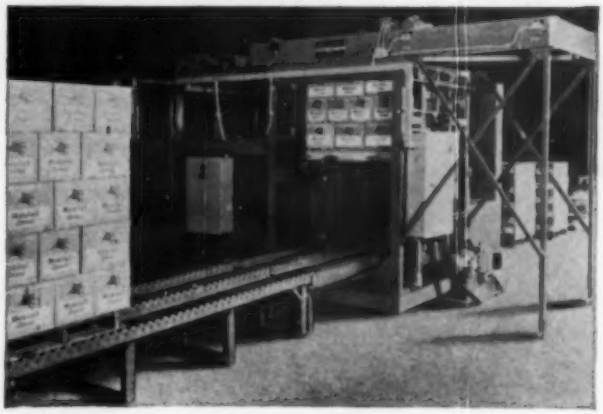

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for strength, economy, durability

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ARMCO Drainage & Metal Products

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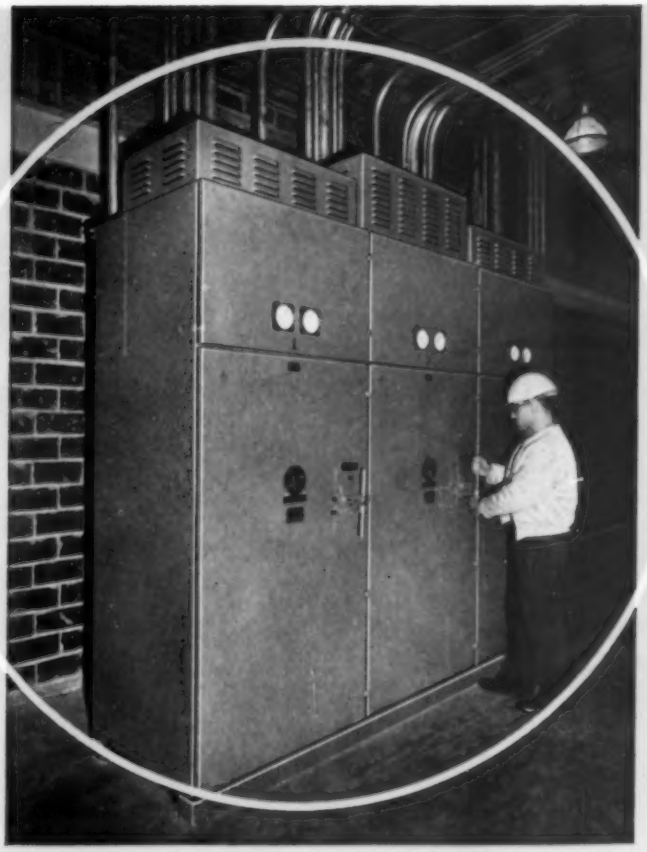

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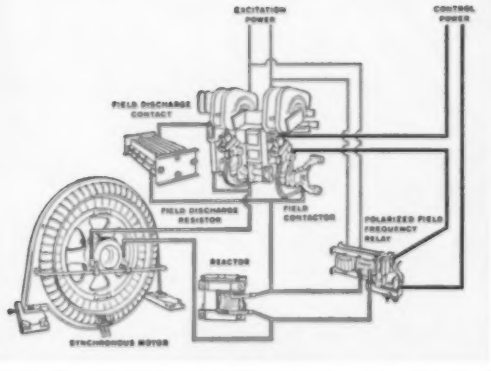

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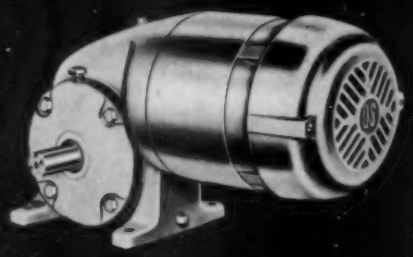

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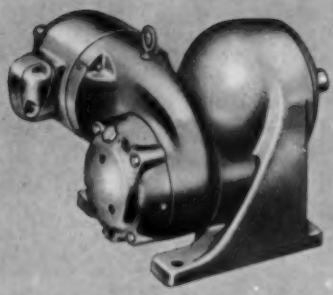

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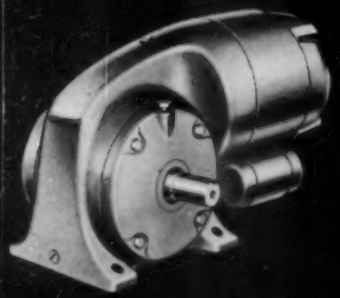

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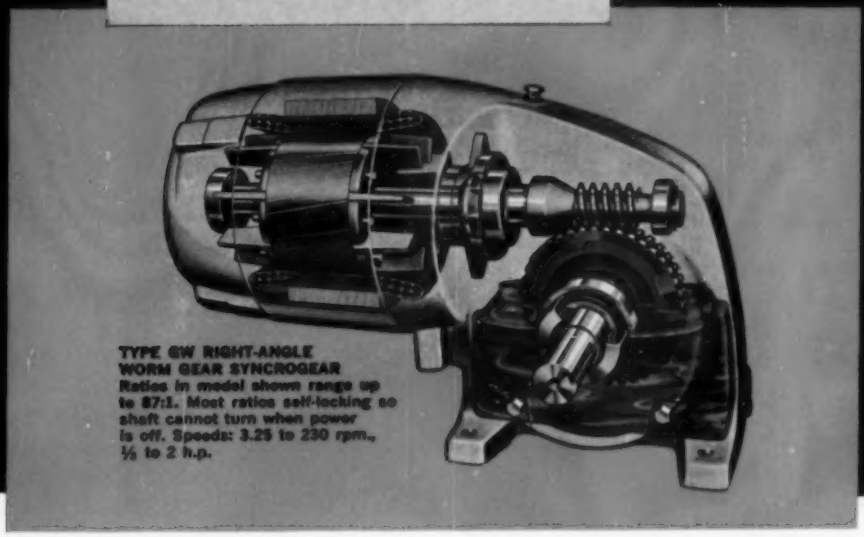

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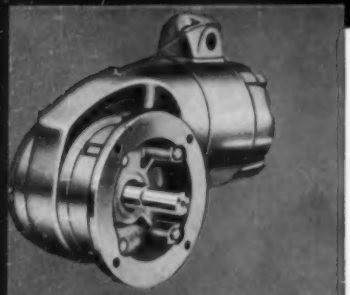

FLANGE-MOUNTED (GWV)—for direct connection to driven machine—Footless. Can be direct-connected vertically or on side with shaft right or left.

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